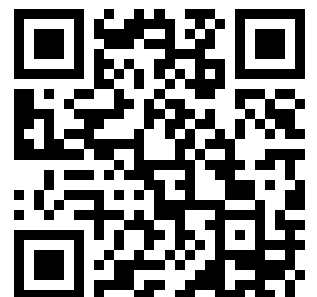


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# American Garage & Auto Dealer

Published Monthly  
116 So. Michigan Ave.  
CHICAGO, ILL.

JANUARY 1920

Vol. 11—No. 1.  
10 Cents the Copy  
\$1.00 Per Year.



## Winter Sales and Profits

Regardless of season or weather—the demand for the SHALER 5-Minute Vulcanizer continues. In severe weather the motorist must insure himself against trouble and delays—and keep prepared at all times for emergency tire repairs.

That is why the repeat-sale profits of the SHALER Patch-and-Heat Units are coming in fast right now, when other sales drop off—and they continue throughout the year.

Millions of SHALER 5-Minute Vulcanizers are

now in use. Every one of these motorists needs the SHALER Patch-and-Heat Units right along to use with their vulcanizers.

This tremendous repeat business—repeat profits—comes to the dealers regularly all year long—without effort.

SHALER 5-Minute Vulcanizers are easy to sell. Every sale is only the beginning of a chain of repeat sales for SHALER Patch-and-Heat Units to be used with this vulcanizer.

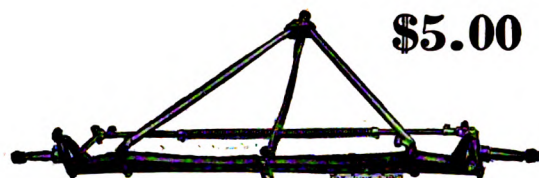
Your Jobber Sells **SHALER** Vulcanizers

Place your order with him at once and keep your winter profits up to your summer level. Write us for catalog of the complete line of SHALER Vulcanizers for garages, repair shops and motorists' use.

**C. A. SHALER CO., 350 Fourth Street, Waupun, Wisconsin**



# CASCO Products for FORD CARS



**\$5.00**

**"Hold 'Em in the Road" for Ford Cars**

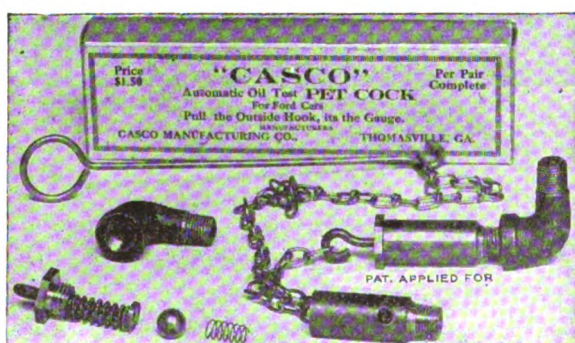
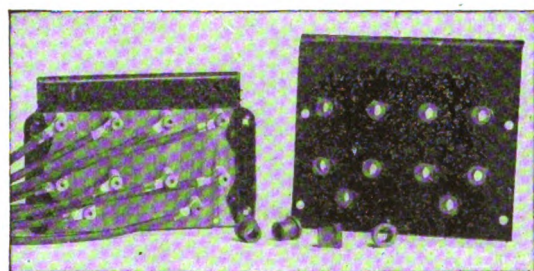
**Put on in  
a Minute**



**50c.**

Clamps here  
to Crank Case  
Flange

Clamps here to  
Crank Case  
Flange



## DEALERS

**"Casco" Specialties** are big sellers among Ford owners. Write for particulars and trade prices.

**"Casco" Products** are handled by all Chicago Jobbers.

## "HOLD 'EM IN THE ROAD"

Combines four valuable attachments—Radius Rod Brace, Anti-Rattler, Axle Support and Steering Device, all in one—Knocks Kinks out of the axle, radius rod, wheel bearing, rattle. Knocks danger and kinks out of driver. Sells for \$5.00.

## "CASCO" FAN BELT GUIDE

Holds the belt so that it will not cut or run off. Attached in one minute. Sells for 50c.

## "CASCO" FORD COIL BOX PROTECTOR

A device that many are trying to copy. Be sure to get the genuine "Casco." Over 200,000 in use. Handled and endorsed by jobbers in 48 states. Protects coils from injury and dampness.

Without Rubber, \$1.00.  
Rubber Insulated, \$1.50.

## "CASCO" OIL DRAIN COCK

The automatic, spring steel, ball seat, oil drain cock. In a class of its own. No cock-wrench—no "get under"—no loss—no leak—no worry. Pull the hook—see oil in engine. Sells for \$1.50 per pair complete.

*Those who offer for sale infringements are liable as manufacturers of infringements.*

## CASCO MFG. CO.

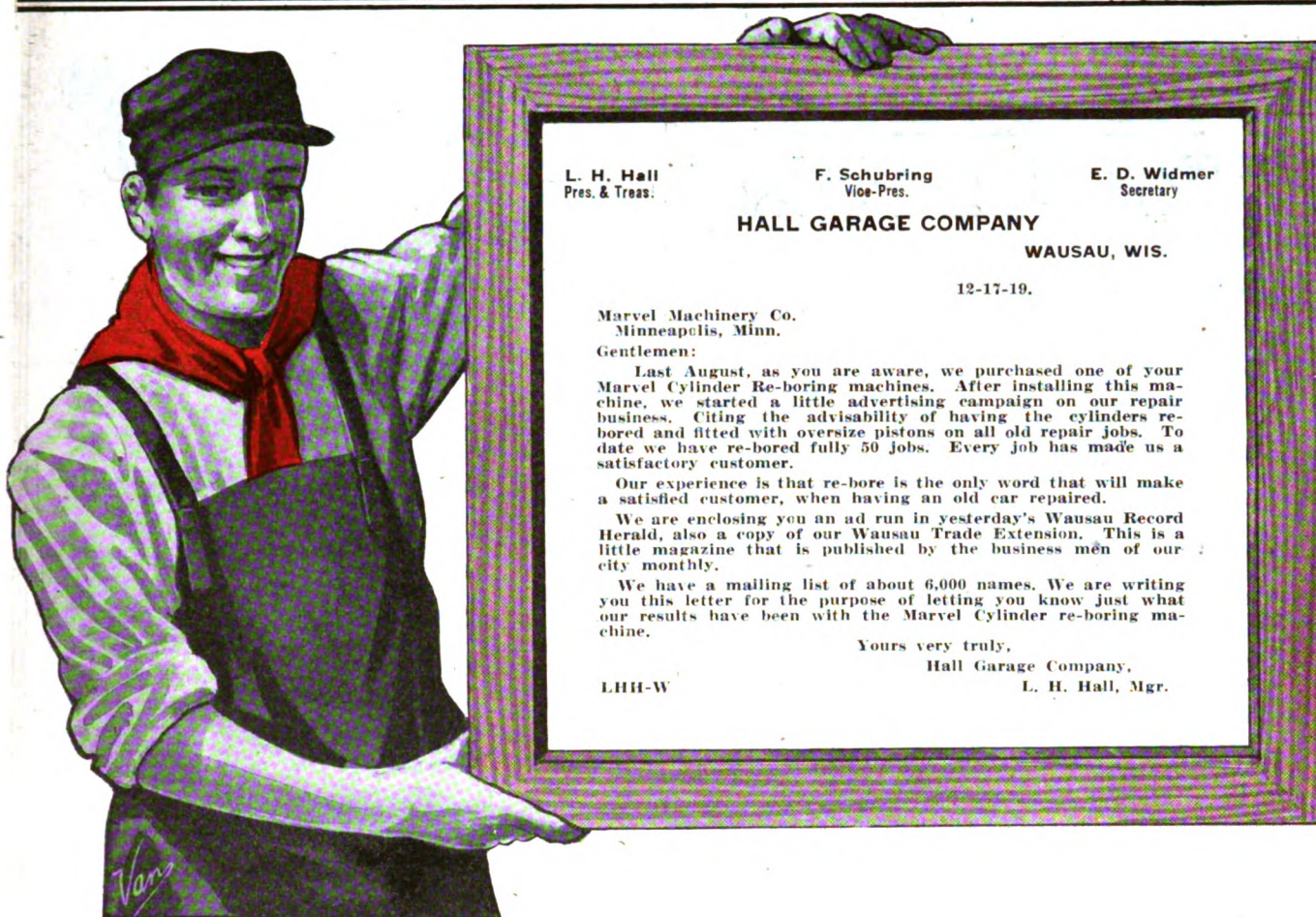
Manufacturers

Thomasville, Ga., U. S. A.

EXPORTER  
Chas. F. Lyngaas  
46 W. Broadway  
New York City  
Latin and Mexican

EXPORTERS  
Muller, MacLean & Co.  
11 Broadway  
New York City  
English

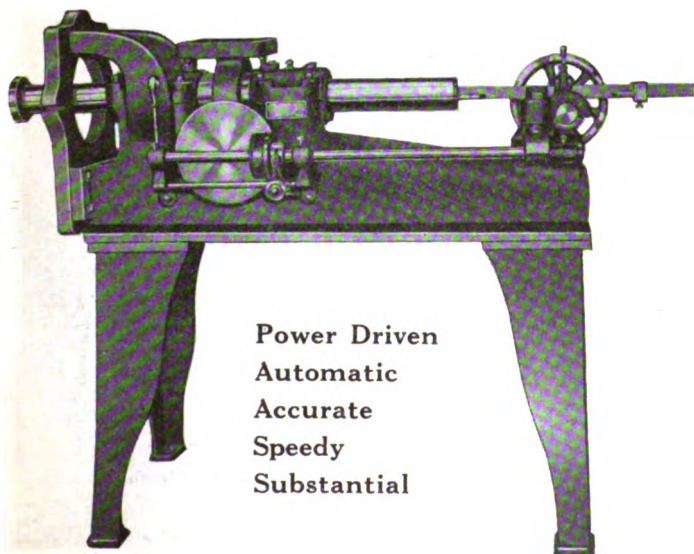




## Read The Above Letter Over Again —It has a Distinct Message for YOU

What they have done in Wausau can be done in Kankakee—Kalamazoo—Kokomo or Kansas City—can be done in every and any city in the United States—regardless of size—if you will install a

## Marvel Cylinder Re-Boring Machine No. 5



Power Driven  
Automatic  
Accurate  
Speedy  
Substantial

and will take advantage of our Business Building Service and will go after business.

Our proposition means not only the purchase of the Best and most Practical Re-Boring Machine Manufactured—a machine which will double the man power in your shop—a machine which is now in use by over a thousand Automotive Schools—Colleges and Repair Men—

It means that with a Marvel No. 5 we furnish you an Advertising Service that brings customers to your shop—It means that our Dealer Helps soon have your shop designated as the leader in your town.

### INVESTIGATE OUR PROPOSITION—

Let us tell you all about the MARVEL NO. 5—let us show you what it will do for you—permit us to send you samples of our Dealer Advertising. We will show you a campaign which will add Red Blood to your business and profit in your Bank.

It will cost nothing to find out—It will pay big to use.

**MARVEL MACHINERY  
COMPANY**

510 Loan and Trust Building  
MINNEAPOLIS, MINN.



The Sign of a Perfect  
Piston

# "NORMA" PRECISION BALL BEARINGS

(PATENTED)



One of the things not affected by the World War or by the conditions which have followed—is "**NORMA**" quality. Prices of materials and labor have changed. But in all the essentials that define value, "**NORMA**" standards have been inflexibly maintained—regardless of cost.

See that your electrical apparatus is "**NORMA**" equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# American Garage & Auto Dealer

*Published Monthly*

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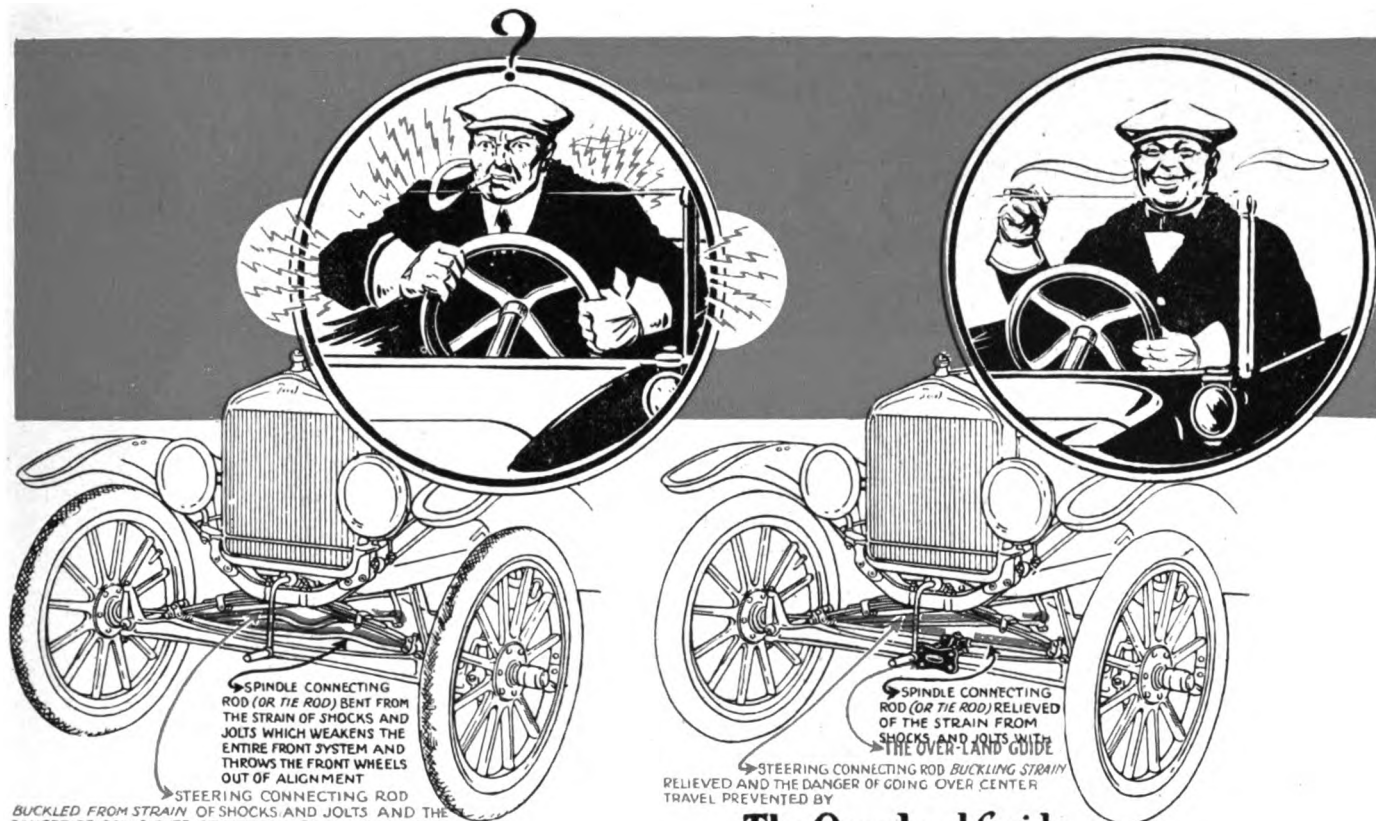
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H. D. FARGO, *Vice President*      E. C. HOLE, *Vice President*  
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G. M. ALLEN, *Mgr. Copy Department*.  
S. J. BORCHERS, *Asst. Advertising Manager*.

Entered as second-class matter, March 1, 1916, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879

Subscription per Annum (Postage Paid) \$1.00. Advertising on Request.





A Ford Controlling Itself

The Over-land Guide  
PATENTED  
Controlling the Ford

## The OVER-LAND GUIDE is Life Insurance for Fords and Ford Owners

Controlling a Ford Car or Truck with its standard steering mechanism is a tough proposition—hard on both car and driver. Intense concentration and more or less effort on the driver's part are required to keep the car in its proper course.

There is the ever present danger when making a short turn that the steering connecting rod will go over center travel, resulting in the loss of control which means the danger of serious accident and the possible destruction of the car and the lives of the occupants. In case of a blowout in one of the front tires the wheel with the flat tire acts as a pivot, throwing the car to one side, sometimes into a ditch, or causing a collision with serious or fatal results.

The OVER-LAND GUIDE eliminates these dangers and gives the Ford driver complete control over his car or truck. It relieves him of the physical and mental strain with which everyone who has ever driven a Ford is familiar. When a Ford Car or Truck is equipped with an OVER-LAND GUIDE the driver can guide the wheel with the tips of his fingers without danger of losing control, even on the roughest roads.

## The Perfect Control it gives the Ford also Reduces Repair Bills

The OVER-LAND GUIDE relieves the strain (due to faulty control) on the Ford steering mechanism and greatly reduces the wear on the tires which ordinarily wobble and scoot, wearing out prematurely. This feature alone saves at least \$30 a year in tire costs.

It REDUCES BREAKAGE AND REPAIRS OF THE FOLLOWING PARTS, such as spindle connecting rod (or tie rod), Spindle body arms and bushings. Spindle body and bushings. Ball and roller bearings and hub. Steering connecting rod and ball joints. Steering gear ball arm. Steering post bracket, bushing and bolts. Steering post, steering gear pinion. Steering gear drive pinions. Steering gear internal gear case and bushings.

DEALERS:—Every Ford owner will eventually purchase an OVER-LAND GUIDE. It saves at least ten times its cost in addition to the protection it affords. Sold on a money back guarantee.

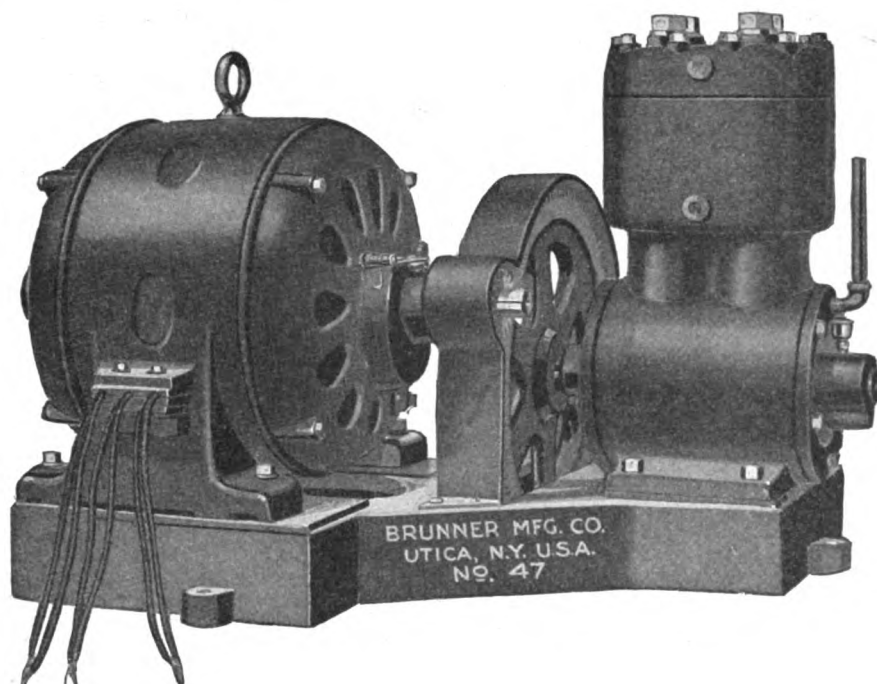
Write or wire for particulars.

## THE MEIXELL COMPANY

Office---216 Board of Trade Building,  
INDIANAPOLIS, IND.

The Automobile Sundries Company, Exporters, 18 Broadway, New York, N. Y., are the sole foreign distributors for the OVER-LAND GUIDE.

The OVER-LAND GUIDE bolts to the center of the front axle and the center of the spindle connecting rod (or tie rod) securely, relieving the vibration and strain in the spindle connecting rod (or tie rod) and entire front system, and the steering mechanism up to the steering wheel.

**BRUNNER**

## No. 47

This No. 47 is a heavy duty machine which has been used for several years in factories and large service stations where the demand for air was constant and unusually heavy. Every detail has been carefully worked out and the perfected machine will give constant service over a long period of years even though operated all day and every day.

Truck owners are more and more coming to the use of giant pneumatic tires and each day sees more trucks in use.

The inflation of these tires is a new problem, involving large capacity at high pressure. As usual Brunner engineers have foreseen this need and have provided Brunner equipment to exactly meet it.

Grateful acknowledgement is made of the assistance rendered by the engineers of several of the large tire companies.

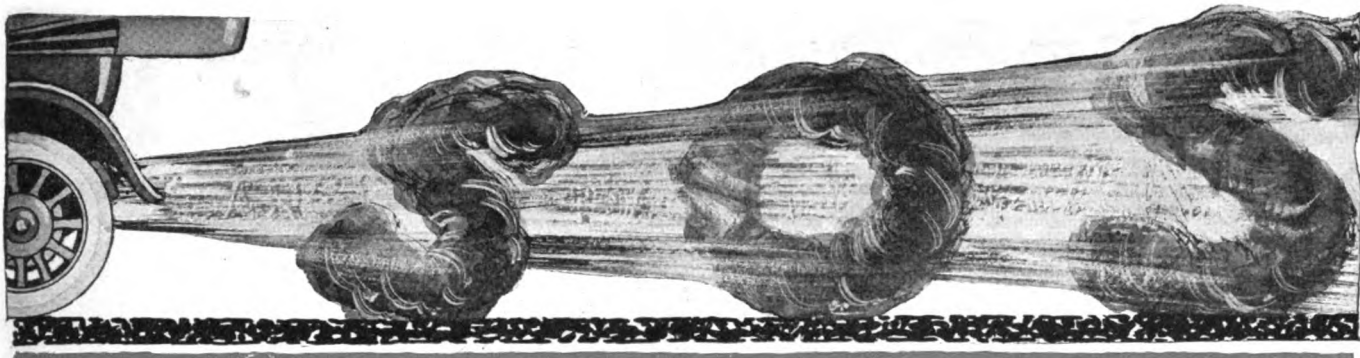
By taking this time tried heavy duty No. 47 with special fittings devised for this new service, we are able to offer equipment to inflate these giant pneumatic truck tires.

Let the Brunner engineers help you in the selection of the proper complete equipment to suit your work and location.

### BRUNNER MANUFACTURING COMPANY

Main Office and Plant, UTICA, N. Y.

Branch Cincinnati, Ohio.



## When the Engine Flashes "Help!" It's a Sign of Leaky Piston Rings

Install <sup>ZELNICKER</sup> *Ever-Tyte*  
The Piston Ring  
for All Engines

S. O. S.!! That's a distress signal being flashed to many motorists. It's an earnest call from the power plant warning trouble ahead. A danger signal not often visible from the driver's seat but very plain to you, Mr. Dealer. Why not tell the owner? He needs new piston rings — <sup>ZELNICKER</sup> *Ever-Tyte* Piston Rings.

Or look at the matter from a selfish business standpoint. *Handle Rings that PAY.* Successful garage men never hesitate stocking Ever-Tytes exclusively. Why? Because they get the long end of the profit. The big margin—the extra percentage. They can *afford* to do a good job. And when you can *afford* to do a thing you do it right and you get *money and trade*, both.

### <sup>ZELNICKER</sup> *Ever-Tyte* Piston Rings

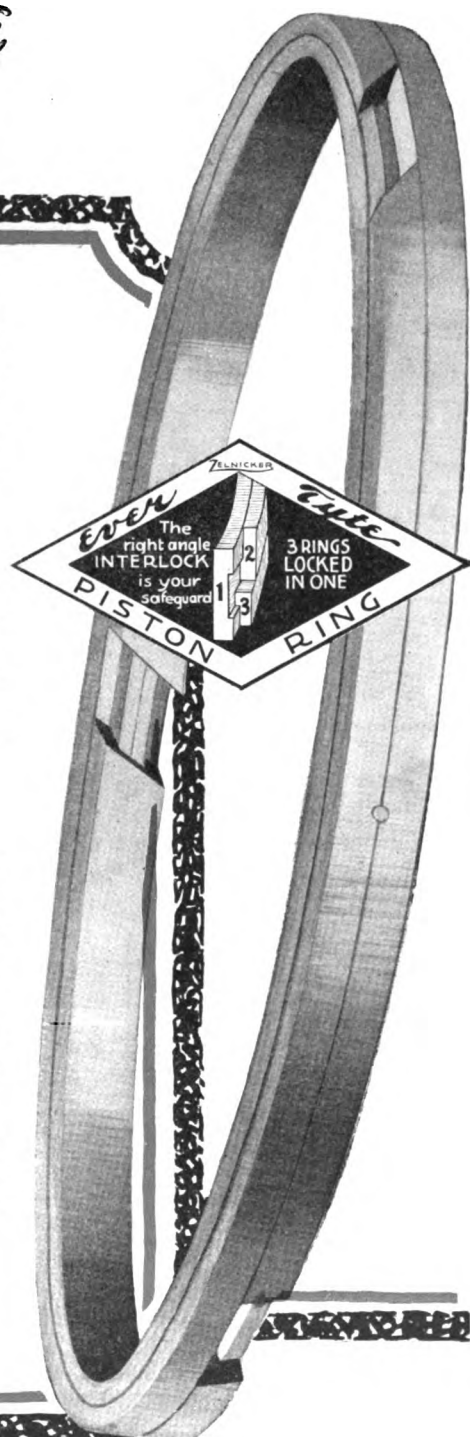
*net you a bigger profit than some rings list for.* You can't beat that. Think it over, seriously. Besides, no better rings can be had. They are Power Guardians that give three for one. Three-piece efficiency with one-piece simplicity.

Guaranteed? Yes—by a Guarantee Bond, more sweeping than you ever heard of before. Iron-clad and lived up to without a word of quibble.

Best of all—they're nationally advertised. Millions have seen them—many motorists are specifying them. Don't wait for the first calls. Resolve to become a money-making Ever-Tyte dealer and — *Do so NOW!*

*Install them — on all engines.*

THE EVER TIGHT PISTON RING CO.  
Saint Louis, Mo.





# SPEE-DEE

**Cleans  
everything**



**Injures  
nothing**

## For your shop

SPEE-DEE will prove to be one of the most valuable helpers that ever came into your garage. Nothing equals it for washing automobiles, bodies, tops, seat covers, celluloid curtains, fenders, wheels, trucks—everything.

Does its work quickly, easily and thoroughly. Moreover—SPEE-DEE is harmless—will not scratch or injure any surface. It cleans greasy, grimy hands with or without water—a valuable feature in cold weather.

It greatly increases your profits on car cleaning jobs.

## For your customers

Every car owner will buy a can of SPEE-DEE as soon as you show him what it can do. You will find that he will come back for more. Whether he cleans his own car or not he will need it to wash his hands after making roadside repairs.

SPEE-DEE has also a great and growing use as a household article for cleaning windows, woodwork, pans, dishes, etc. Many SPEE-DEE dealers in the automobile field are getting a good share of this business through their customers.

*The "One Best"  
Cleaner for  
Automobile Work*



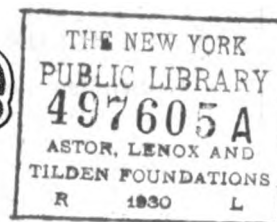
*Your Jobber Can Supply You*

## States Chemical Company

680 W. Austin Avenue

Chicago, Illinois

# American Garage & Auto Dealer



Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,  
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XI. No. 1

CHICAGO

January, 1920

## National Local Advertising.

The value of advertising has been discussed so much that there are but few persons who are not convinced that "It pays to Advertise."

We are all familiar with "Heinz 57 Varieties," "The Gold Dust Twins," "Eventually, Why Not Now?" "Good-year Tires," as well as numerous other well-known advertising catchwords. Our familiarity with these has been acquired as a result of what is known as national publicity—that is, the different articles or products have been advertised by the manufacturer through various mediums having a national circulation.

The purpose of the manufacturer in national advertising is to interest and create a national consumers' demand which must necessarily be satisfied by local dealers. The dealer is primarily interested in making money, so it behooves the manufacturers to get acquainted with dealers by advertising in specialized trade or business papers, thus arousing interest, desire for co-operation, and finally patronage.

In his national publicity campaigns the manufacturer aims to directly interest the consumer and indirectly to aid the local dealer. Obviously, it is much easier for the latter to draw people to his place of business if he will dovetail his local advertising with articles or products which are being nationally advertised. In other words, the dealer must supplement the manu-

facturer's advertising, which has aroused interest and created a potential demand.

The local dealers are frequently provided with advertising copy, and other publicity matter by manufacturers who sometimes bear part of the cost of running the advertisements in

---

## Carelessness.

"I am not much of a mathematician," said Carelessness, "but I can add to your troubles, I can subtract from your earnings, I can multiply your aches and pains, I can take interest from your work, and discount your chances for safety.

"Besides this, I can divide your thoughts between business and pleasure and be a potent factor in your failures. Even if I am with you only a small fraction of the time, I can lessen your chances for success. I am a figure to be reckoned with.

"Cancel me from your habits and it will add to your total happiness."  
—Schenectady Work News.

---

the local newspapers. Unfortunately, in these prepared advertisements, the manufacturers feature their name and product while the local dealer is kept in the background, although he has paid a considerable share of the advertising cost.

On other pages of this issue, this angle of local advertising is discussed. Unquestionably, the local dealer should receive prominence in the local newspaper advertising of nationally-advertised products. Through the

national advertising, the product has become well known, and there is no reason why the local dealer's name should be relegated to an inconspicuous position in the local advertisements. In fact, there is every reason why it should be featured just as much as the name of the product advertised.

It is only by such whole-hearted co-operation that ultimate success can be achieved. Let's have more of this kind of co-operation.

---

## For Value Received.

They were discussing high prices and the high wages that are being paid; said one of them, the head of a large manufacturing company:

"We are not so much worried over the high cost of labor and material as we are over the low production. It is probable these high wages can be maintained with a fair degree of comfort if the workers would do a fair day's work for a big day's pay.

"The trouble is that they are doing less work for their increased wages. We need more production in every line in this country if we are to catch up with the demand for all sorts of commodities and end the high cost of living. As wages have advanced, however, per capita production has been reduced, which, of course, is not only most unfair to employers but detrimental to the whole people, because it delays a return to normal conditions."

It has been over a year since the

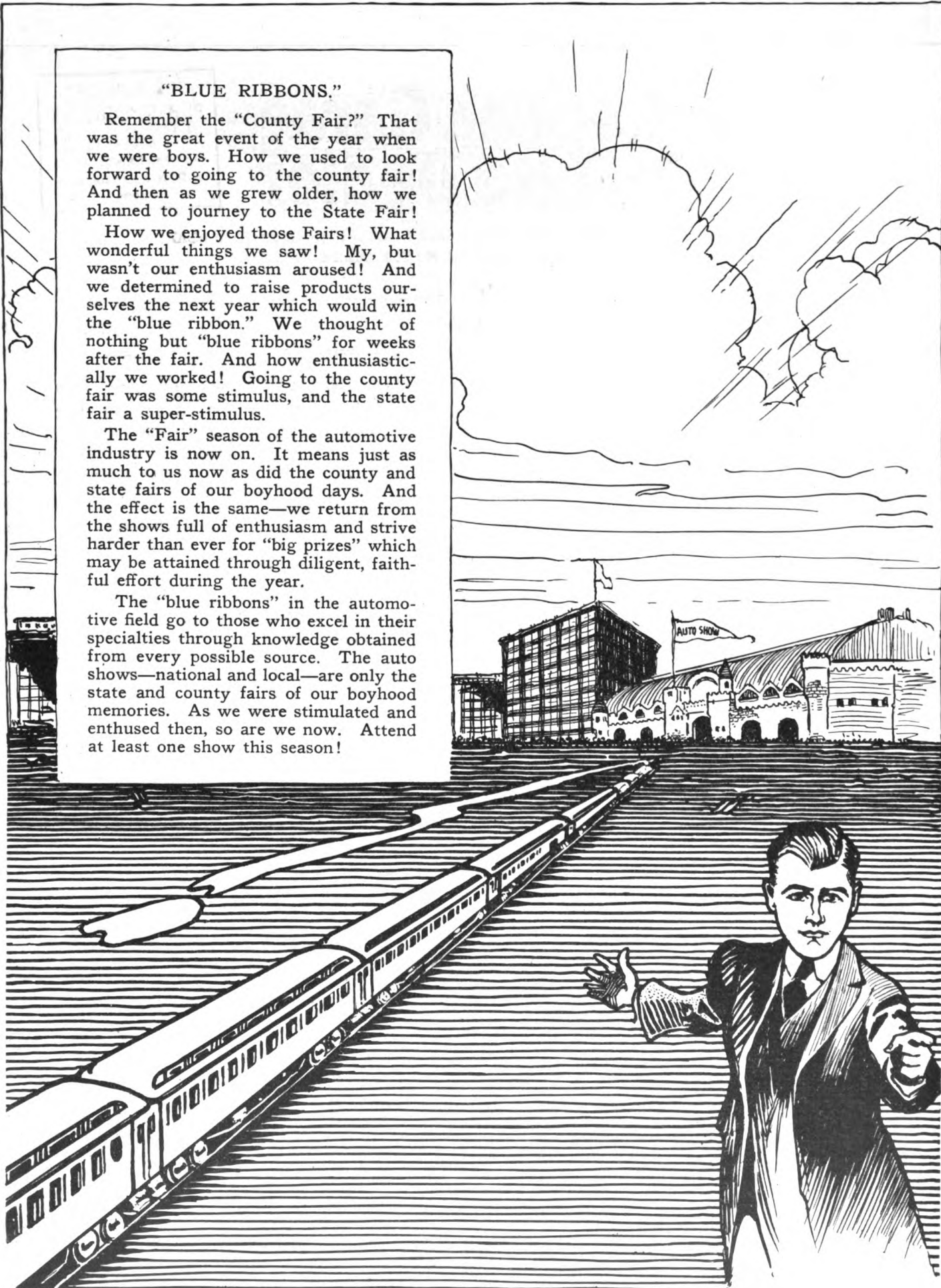
### "BLUE RIBBONS."

Remember the "County Fair?" That was the great event of the year when we were boys. How we used to look forward to going to the county fair! And then as we grew older, how we planned to journey to the State Fair!

How we enjoyed those Fairs! What wonderful things we saw! My, but wasn't our enthusiasm aroused! And we determined to raise products ourselves the next year which would win the "blue ribbon." We thought of nothing but "blue ribbons" for weeks after the fair. And how enthusiastically we worked! Going to the county fair was some stimulus, and the state fair a super-stimulus.

The "Fair" season of the automotive industry is now on. It means just as much to us now as did the county and state fairs of our boyhood days. And the effect is the same—we return from the shows full of enthusiasm and strive harder than ever for "big prizes" which may be attained through diligent, faithful effort during the year.

The "blue ribbons" in the automotive field go to those who excel in their specialties through knowledge obtained from every possible source. The auto shows—national and local—are only the state and county fairs of our boyhood memories. As we were stimulated and enthused then, so are we now. Attend at least one show this season!



war closed. While the war was on, many wise men worried about how to employ the millions of men to be released when the armistice was signed. There were vivid pictures of unemployment and low wages.

Actual events have proved the contrary. There have been great business activity, high prices and a labor shortage. The reason is that the country has put in the year since Armistice Day spending money like a drunken sailor, and yet howling about high prices, instead of everybody going to work to increase production.

It is well stated that the *talkers* have been *working* too hard and the *workers* have been *talking* too much.

That in a nutshell describes the situation throughout the country which has existed the past year, particularly in the large cities and industrial regions. But readjustments are gradually taking place and production is being increased in many lines. The automotive field is one in which production has steadily increased since the signing of the Armistice and the prospects are bright for 1920.

#### 1920 and the Future.

So much has been published in the trade press and newspapers relative to the prospects of the automotive industry in 1920 that it is superfluous for us to comment upon that subject. After all is said and statistics quoted, it appears that the 1920 production will approximate  $2\frac{1}{4}$  million passenger vehicles and 400,000 trucks.

The problem of the industry at this time primarily is not one of selling—the demand is greater than the supply. It is production, but that is increasing and will be greatly augmented during the year, for increased manufacturing facilities are being placed into service rapidly.

The sales trend is toward the development of the motor truck field, particularly in the agricultural territory. It is in these districts that the greatest percentage of increase in car registration has been the past two years.

It is in this agricultural territory that the automotive dealer in the future will be most successful. There will be a steady demand for new automotive vehicles, merchandise and repair work. The dealer who becomes

---

#### WHY HE FAILS.

There's many an industrious man  
Who never gets ahead,  
Because he does not think or plan,  
But trusts to luck instead.

He's not a slacker or a shirk,  
This plodder in Life's grind;  
But though he always minds his work  
He never works his mind.

—Rural World.

---

firmly established now and keeps apace with the times need not worry about his future.

#### Keep After Collections.

"The accounts receivable on that statement are unusually large," was the declaration made as the monthly statement of a company's operations was being looked over by one of the directors. "It inclines me to believe that the manager is lax in his collections. He should pay more attention to getting in the money due from customers."

The most important thing in any line of business is to educate customers to make payments promptly upon the first presentation of their bills so that there will be no expense for frequent requests for payment. Often, too much consideration and latitude are given to those neglecting to make payments. When accounts do start to slip behind, nothing is as necessary as following them up continually and persistently.

When chronic delay is the usual habit, fear of losing a patron should not deter a manager from refusing further service when he feels that the customer's account justifies it. Generally speaking, the customer who compels such extreme measures has lost credit elsewhere, and it will be

found proper business to discontinue relations with him until he has paid up his account. After that, deal with him only on a cash basis.

Time lost in collecting accounts is money lost, and usually a past due account breeds a disgruntled patron. The smaller the amount of accounts receivable, in proportion to the total assets, the more prosperous a business.

---

#### Ruts of Humans.

A sign alongside the highway over which many automobiles pass reads: "Please do not drive in the ruts." The reason, of course, is that ruts are bad for the road—but it is so much easier to drive an automobile in them. So in life, it is much easier to allow oneself to get into a rut and stay there. It requires less exertion, but in time the ruts become deep, uneven and rough and it is hard to follow them. Then the ruts must be abandoned and new ones made.

If a man wants to advance in life nowadays, he must be something more than a follower of ruts. He must make or save money for his employer. The men higher up avoid ruts—they may make them but not follow them. Their assistants must see that the ruts do not become too deep and rough. They must keep the road smooth, and then some day they become the road-builders. They know how to do things and are paid for it.

There was a time when mere nerve and big talk would hold a job, but that day is passing. It is now a question of "know how" and "What can you do?"

That man is not in a rut who, in answer to a question such as, "Can you clear this case of trouble which we have not been able to locate?" replies "Yes"—and does it. He can be trusted to get results on any assignment given him, without requiring too much supervision. He is the man who can answer the question, "What can you do?" in a convincing manner—and then is able to back up his claims in a most satisfactory way.



# What the New York Show Revealed

Twentieth Automobile Show Broke All Former Records—Automobiles for 1920 Will Be Along Conservative Lines, Generally Lighter in Weight, Simpler in Design and More Economical—War Experiences Applied to Engines

In attendance, in splendor of decorative arrangement and in magnitude, the twentieth annual passenger automobile show, held under the auspices of the National Automobile Chamber of Commerce, at the Grand Central Palace, New York, broke all former records for any single show in the country.

New York is accustomed to superlative things but even Cosmopolitan New York was amazed when it got its first look at the show, the greatest ever held, where 94 exhibitions of passenger cars and 227 exhibitions of accessories, parts and sundries were very artistically arranged on the four floors of the Grand Central Palace.

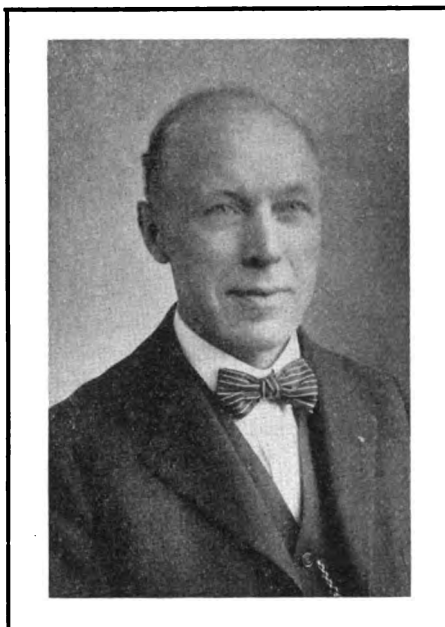
Hundreds of men and women, who before the war gave little attention to automobiles, were there because under the stress of war they became acquainted with carburetors, tires, mufflers and other parts of a motor car, and wanted to see what is being done to make driving more convenient, or riding more of a pleasure.

Then, too, the national automobile shows set the fashion in automobile chassis and body design. Consequently, New York's cosmopolitan men and women of fashion and society and of medium means flocked to the show to observe the progress achieved in the one industry which touches the daily life of all of our people.

Cars were on exhibit to appeal to every capacity of pocketbook, as well as to every whim of taste, for models ranged in price from \$715 to more than \$11,000.

The new things, however, in motor construction for 1920 are all based on conservative lines. Nothing radical, nothing bizarre, will be found, but in the opinion of the leading engineers, the American cars that the American public will buy during the present year will be better than ever before for all kinds of road use; generally lighter in weight, simpler in operation, greater in developed power and more economical in fuel consumption.

The new departures in design learned from arduous war experiences do not stand out on the surface. They will be appreciated chiefly by those who have sufficient mechanical insight to understand how minor changes make for lighter weight, easier operation, and the least possible waste of fuel, with the utmost mileage capacity from the quantity used. In a few cases, traces of lessons learned



S. A. Miles, Manager of New York and Chicago Shows.

from aero-engine construction as a result of extensive tests conducted by the government during the war, and as applied to the automobile-engine were seen.

With 84 exhibitors of distinct makes of passenger cars, all former records for any single show in the country have been broken. These 84 makes of passenger cars which

were shown with a great variety of open and closed bodies, are:

Allen, American Beauty, Anderson, Aperson, Auburn, Biddle, Briscoe, Buick, Cadillac, Case, Chalmers, Chandler, Chevrolet, Cleveland, Cole, Columbia, Comet, Commonwealth, Crow-Elkhart, Davis, Detroit Electric, Dixie Flyer, Dodge Brothers, Dorris, Dort, Elcar, Elgin, Fiat, Ferguson, Franklin, Grant.

Haynes, Hollier, Holmes, Hudson, Hupmobile, Jackson, Jordan, King, Kissel-Kar, Kline Kar, Lexington, Liberty, McFarlan, Malbohn, Marmon, Maxwell, Mercer, Metz, Milburn Electric, Mitchell, Monitor, Moon, Nash, National, Oakland, Oldsmobile, Overland, Owen-Magnetic, Packard, Paige, Paterson, Peerless, Pierce-Arrow, Pontiac,

Premier, Reo, Roamer, R. & V., Sayers, Scripps-Booth, Standard, Stanley, Stearns-Knight, Stephens Six, Saxon, Steven-Duryea, Studebaker, Stutz, Templar, Velie, Westcott, Willys-Knight, and Winton.

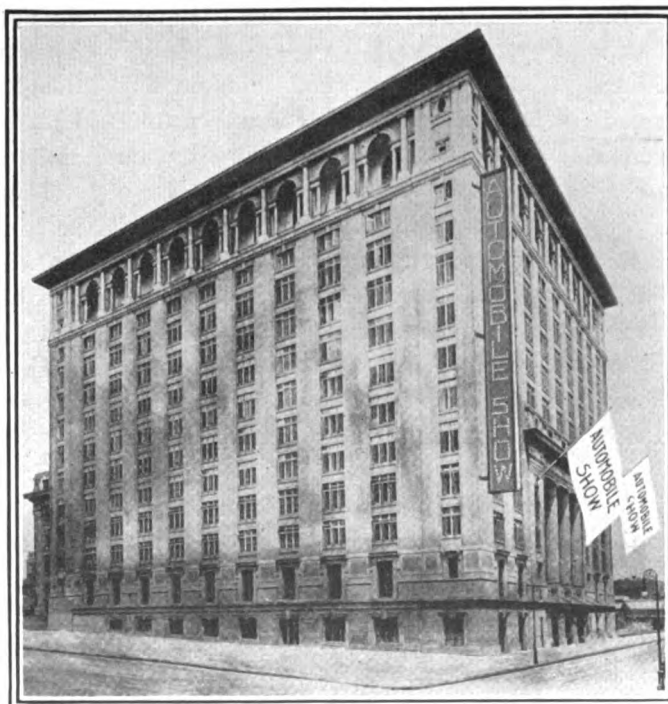
In addition to these cars, the Lafayette, the first brand-new 1920 creation, was exhibited in the lobby of the Hotel Commodore. It was shown in a touring sedan model. It is an eight-cylinder car, with a 132-inch wheel base; its factory home is in Indianapolis, and it is designed by D. McCall White.

While there was a generous variety of four-cylinder motor types, the sixes predominated. An interesting estimate recently compiled by one of the early six-cylinder engine manufacturers shows that of all American automobile types, six-cylinder automobiles now represent 55.8 per cent.

The six-cylinder popularity has been increasing steadily for more than ten years. In 1918, for the first time, with a total of 51.7 per cent, it exceeded all other motor types. In 1919, it advanced to 53.2 per cent, and the 1920 models have added another increase of slightly over 20 per cent.

For 1920, greatest attention has been given to body design, to engines, and to chassis detail; while clutches, transmissions, steering mechanisms and axles have received practically no attention.

The demand for cars with low upkeep cost has produced many light-weight cars and before long, it is expected that a great



Grand Central Palace, New York's Show Building.



many more small light-weight cars will be put on the market. Many changes have also been made to the smaller items of equipment; to such things as doors, door handles, cowl boards, instruments, and fendering. Then, too, to give the car a semblance of newness, the body has been attacked and there is a bewildering array of conceptions.

For the most part, however, the designers have adhered to the basic lines shown last year. This body has a high hood, usually with an angle at each side, the line of the angle meeting the top edge of the body. Hoods have more louvres, windshield supports are more substantial and shields are much in evidence; a few concerns have taken up small built-in side pieces attached to the windshield. This form will undoubtedly be standard equipment in a few years.

A few years ago car makers were producing 10 per cent enclosed models and the remainder open. This was a fair average. Today, as was seen at the shows, the enclosed models constituted two-thirds of the models, and in production will average close to 40 per cent.

Care in assembly and the elimination of a great many unnecessary parts have resulted in reducing rattles and repairs. Better methods of attaching the body to the chassis were in evidence, as were other little refinements that enable cars to go farther over rough roads without developing squeaks and other unpleasant features.

Then, too, there were scores of accessories—tires, magnetos, uncannily handy appliances and tools, labor and time-saving ideas embodied in the most practical forms.

There were considerably more overhead-valve engines and those that were not new have been improved, especially so far as lubrication is concerned. Power output is greater on the average engines, though displacement has not varied much. The fuel problem has brought about a vast number of changes in manifolding and practically every engine has some means of heating the mixture.

Some examples of advanced engineering appeared at the show, and such new practices as bearings without shims, new designs of high-pressure oiling systems, and new detail improvements in valve gears were in evidence.

Most of these new things have come as a result of war experience, and one will find that where such changes are noted, they are on products of concerns which were doing war work on engines. The detachable cylinder head, vacuum fuel feed, battery ignition, six-volt separate unit starting and lighting are features that have not changed.

Aside from engine development, the universal and the wheels have been given greatest consideration. There will be considerably more fabric universals than ever before, and it looks as though this type will take the place of the all-metal joint

for certain installations where the shaft angularity is not great. The show cars were for the most part fitted with metal wheels although wood is still the standard for regular production.

For the first time in the history of the shows held under the auspices of the National Automobile Chamber of Commerce, commercial motor vehicles, as well as passenger cars, were exhibited during the same week. This, therefore, was a double-header automobile show week. The passenger cars occupied the Grand Central Palace, while the motor trucks were displayed in the 8th Coast Artillery Armory, at Jerome avenue and 194th street, in the Bronx.

Although at a considerable distance from the passenger car exhibition, at Lexington Avenue, Forty-sixth and Forty-seventh Streets, the two shows were so dis-

tor vehicles is a striking illustration not only of the growing realization among business interests of the utility and economy of the motor truck, but also of its value in long distance transportation.

This latter feature, which was greatly stimulated in the successful use for war purposes, both here and abroad of thousands of motor trucks, has given a wonderful impetus to the motor industry which only began to develop the commercial car need three years ago, but this phase of the industry is clearly destined in the near future to a remarkable growth.

### Farm Implements of Interest to Visitors at New York Show.

With more than 90 per cent of its entire 50,000 square feet of floor space on the seventh floor of Grand Central Palace, occupied, the permanent International Tractor, Trailer & Farm Implements Exchange presented much of interest to New York automobile show visitors and exhibitors.

The exchange is one of the permanent divisions of the International Exposition of Industries operated by the Merchants & Manufacturers' Exchange of New York. Everything in the agricultural machinery field is offered, numerous makes of trailers being shown, together with tractors and other power-driven machinery.

Among the manufacturers whose products are included in this permanent comprehensive display are such companies as Advance-Rumely, the Avery Co., J. I. Case Plow Works, Chicago Steel Post, Craine Silo, Detroit Trailer, General Ordnance, Holt, International Harvester, Northway Trailer, and Ohio Trailer.

## Future Shows

Boston, Mass., March 13-20.

Brooklyn, N. Y., February 14-25.

Buffalo, N. Y., March 1-6.

Chicago, National Automobile and Truck Show, January 24-31.

Cleveland, Ohio, January 17-24.

Denver, Colo., March 2-6.

Detroit, Mich., February 14-21.

Greenfield, Mass., February 9-14.

Kansas City, Mo., January 31-February 6.

Kansas City, Mo., Fifth Annual Tractor Show, Auspices Kansas City Tractor Club, February 16-21.

Los Angeles, Calif., March.

Louisville, Ky., February 23-28.

Mason City, February 11-14.

Minneapolis, Minn., January 31-February 7.

Montreal, Quebec, February.

Nashville, Tenn., February 9-14.

Omaha, Nebr., March 1-6.

Philadelphia, Pa., January 10-17.

Pittsfield, Mass., February 23.

Portland, Ore., February 23-30.

San Francisco, Calif., February 21-28.

Spokane, Wash., January 21-25.

St. Joseph, Mo., March 1-6.

St. Louis, Mo., March 1-15.

Syracuse, N. Y., March 1-6.

Toledo, Ohio, February 2-7.

Trenton, N. J., March 22-27.

tinct in appeal as to present no competitive elements, and a number of buses were provided to take interested visitors to the Armory from the Palace building.

The motor truck show was the largest exhibition of commercial motor vehicles ever held in America. About 69 different makes were displayed, including everything for commercial use, from the light half-ton delivery wagon to the heavy five and seven-ton trucks which are now being utilized for so many of the transportation needs of the country.

Such a large number of commercial mo-

Waltham, Mass.,  
December 19, 1919.

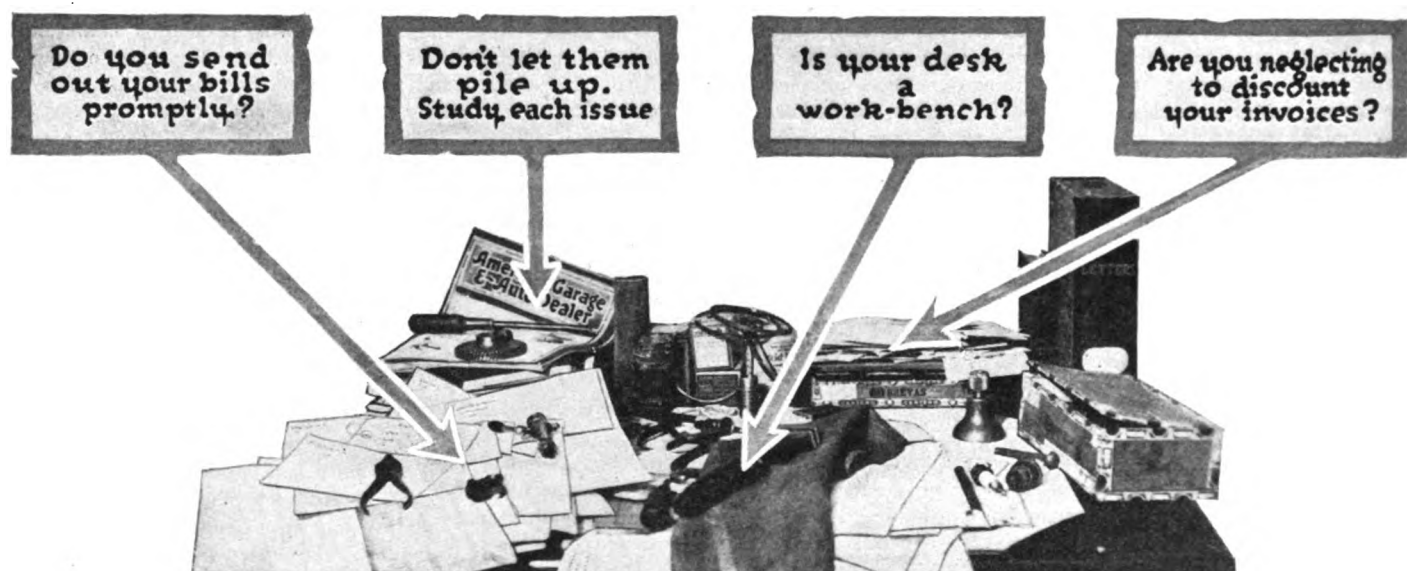
Dear Sirs:

We like your magazine very much and do not mind saying so. Each number so far has been bright, cheerful, live, optimistic, and progressive.

But what we like most are your statements. Whoever puts them over is an adept individual in the way he presents his case. Pleasingly persuasive, they get what they are after. Your allusion to our being too busy to notice your small account up to now hits the nail on the head, for it accords with the facts in our case.

We assume that you are pleasant people, and we assure you we are kindred spirits and so we enclose check for \$1 and wish you the compliments of the season and best wishes for the new year.

E. A. BURNE MOTOR CO.



# Are You Succeeding in Business?

Is Business So Good That You Find No Time to Look After It Properly?—Do Not Harbor the Idea That Working Hard Is All That Is Required—To Make Business Pay, You Must Study It, You Must Take Time to Check Results

By Robert Falconer

"That is a good thing to do, if you have the time and can afford it," said a small business man after a system of checking up his business had been shown him, "but I have to work so hard, and it takes so much of my time to make both ends meet, that I haven't the time." That man never got enough ahead so that he thought he could afford to take the time necessary to keep close track of his business. He has remained in business, but has never made even a good living.

This garageman had a pile of bills on his desk that he owed. In the other corner were bills he had made out, but had not yet mailed. When questioned, he said: "Business is so good that it takes all my time to look after it. Just as soon as I get the time I am going to finish making out those bills and send them out, and I am going to make out checks for all of these. I haven't had time even to open all of them yet."

Before very long this man did have time to look into his business more closely—the sheriff attended to that. When the red flag was taken down and all accounts settled, this man discovered that he was several thousand dollars poorer than he was before he had done such a good business that he did not have time to look after it.

Every business must be steered. No

business will run itself. A man cannot spend all his time doing the work of the crew, if he is going to handle the navigating of the business ship. It will make no difference how hard the crew works, or how much interest it takes in its work, if the navigator fails to do his part, sooner or later the ship will be driven upon the rocks.

There are probably as many business men who fail because they work too hard as because they do not work hard enough. Working hard may not give them time enough to direct the business properly. The man who is making the most money out of his business is often the one who appears to be doing the least work.

In business it is the exercise of intelligence, the application of sound common sense, that counts more than the actual work that is done. The pilot up on the bridge, who is bringing the ship safely into the harbor does not seem to be working hard. In fact, everyone else on the ship may be working harder than he is. It is his knowledge of the channel and the directions that he gives, however, that prevents the ship from running aground or striking a rock. It is what he has learned about the channel, what he actually knows about it, that counts more than what he actually does.

The man in the automobile acces-

sory business, in the repair business, or in the garage business, will find it far more profitable to spend a reasonable amount of time in studying his business and in learning all the latest methods of doing business than he will in devoting all of his time to hard physical work. Accounting that prevents leaks, that keeps all bills paid promptly, that does not allow customers to continue to run up bills until they cannot pay them, is needed.

It does not make very much difference how hard and how fast you work bailing out a boat, if there is a big hole in the bottom and you are bailing with a sieve. In the same way, it does not make much difference how hard you work to make your business a success, if there are a lot of leaks that you do not take the trouble to stop.

There are three ways in which the business man can use his time to gain a greater knowledge of his business.

He will find it exceedingly profitable to read and study his trade papers, both the editorial and the advertising columns. Some very remarkable results have been achieved as the direct result of studying trade papers.

A man who thought he had learned a business started a little concern of his own. He knew so much about it

that he did not think that it would be necessary to study trade papers. Therefore, he did not subscribe to any. Things did not go well. At the end of eight months he was cleaned out and had to get a job to support his family.

While he was working at this job he began to study trade papers. He subscribed to and read all of those published in his field. They gave him so many new ideas that he felt sure that if he started once more he would succeed. Accordingly, in about a year he did start once more. This time he did not have as much money with which to start as he had had the first time. But he knew more about the business and from his trade papers was constantly securing new information that helped him. As a result, he succeeded from the very first and now has a good business of his own.

Not every man can gain as much from the study of trade papers as this person did, but everyone will find that they contain many ideas that will help him. Therefore, one of the first rules to adopt is to spend a reasonable amount of time in reading and studying the trade papers.

The second way in which a business man can spend his time profitably learning things about business is to be active in the work of the associations in his trade. There are times when it appears as though it was an actual waste of time to belong to and to do work in such associations. If, however, at the end of the year, a man will total up the profit that has resulted in his business from ideas that he has been able to pick up as a result of his connection with these associations, he will find that it has really paid.

The suggestions secured are not always positive ones. Sometimes they are negative ones. The cause of the failure of certain men becomes so apparent that it deters one from making similar mistakes. The amount of money that one is prevented from losing as a result of these horrible examples is just so much money saved. It is just so much extra profit.

The third way in which every business man should spend part of his time is in watching and charting his business. Enough records should be kept so that leaks can be stopped and future leaks prevented, and there should be complete knowledge of the departments of the business which are

furnishing the profits and which are in danger of showing a loss.

All bills should be paid promptly and all discounts taken. The system of bookkeeping should be such that there is no possibility of overlooking a bill. No credit customer should be allowed to fall behind in his account. The more he falls behind, the harder it will be to collect anything from him or even to hold him as a customer. All bills, therefore, should be collected promptly if the greatest volume of business is to be done.

Inventories should be taken frequently and the profits and losses of the business carefully checked up. In short, the business should be given frequent overhauls and kept tuned up. As soon as a rattle or a knock develops, the cause for this rattle or knock should be discovered and removed.

No business can be run at high speed and show the greatest profits

**The man who succeeds in life is the one who merits success. He has gone into training. He is willing to pay the price of hard work and concentration. He is ready to make an effort when far-sighted judgment declares such effort will pay. He is a leader, not a follower. He does not waste his time telling how lucky the other man is. He goes after success with earnest determination to capture it. And being of the right stuff, he succeeds.**

unless it is kept in the very best running order. It must be given as much attention as a racing car if it is to be kept in this kind of order.

No one would think of entering an important race with a car that had not been given a thorough inspection for a year or two, but there are men in business who have not given their businesses a thorough inspection for many years.

No one expects to get the greatest gasoline mileage from an old rattletrap of a car, or even to find it trustworthy enough to always bring him back home again, but there is many a business that has been allowed to get in such a condition and is still expected to show a profit.

Every business man is in a race. All of his rivals are after each dollar that his customers and prospective customers have to spend. Unless he

keeps his business tuned up to the point where it runs smoothly and picks up quickly, he will not be able to get as many of these dollars as he should.

It is for reasons such as these that an accurate and complete system of bookkeeping is necessary in all lines of business. The one man out of a hundred who really makes a success of business has such a system. Most of the eighty who make a failure of business do so because they spend so much time in manual work that they do not have the time to keep the accounting end up to the point where it must be kept if the business is to show a profit.

After a man has given a reasonable amount of time to the reading and studying of his trade papers, after he has given enough time to his trade organization to enable him to pick up all the ideas he can from them, and after he has made sure that his bookkeeping system is adequate and accurate, he should apply the ideas he has acquired to his business. It is only the time which he has to spare after he has done all of this that he should devote to actual hard work. It is because so many men reverse this process that we find about 95 out of every 100 working very hard to make both ends meet.

### **Great Interest Aroused in New Motor Fuel in England.**

A test was recently made in Nottingham, England, of a new motor fuel, the invention of a South American named Andrade.

The fuel is produced by mixing with water a compound known only to the inventor. When the liquid was poured on the ground, it burned steadily and emitted no smoke. The odor, it is said, does not resemble that of petrol. Half a bucketful was poured into the tank of an automobile which traveled with perfect smoothness and at a high rate of speed.

More water was added, so the report states, and this seemed, if possible, rather to improve the running of the engine. It is also stated that the car traveled more than 30 miles on one gallon, and that if Andrade's assertions are true, a gallon can be manufactured for 10 cents. The inventor claims that it will prove even more valuable for submarine craft than for automobiles as practically no air is necessary.

# Why Your Window Is a Poor Seller

Dumping a Lot of Stock in the Window Does Not Sell It—Neither Would a Theater Draw a Crowd Without Stage Settings—Proper Setting Attracts, Creates Desire, and Impels People to Buy—Fundamentals You Should Know

By J. E. Bullard

When a new play is to be given in the theater a great deal of time, attention, and thought is given to the stage setting and the costumes. There are very few plays, indeed, that would draw a crowd if the play was given in a bare, unattractive building, without stage settings, and with the players wearing ordinary street clothes. The stage accessories, the scenery, the decorations, the special lighting, and the costumes of the players, all add to the attractiveness of the play and mean just so many more dollars in the pockets of the promoters.

In a great many respects the show window is like a theater stage. Merely dumping a lot of stock in the window does not sell it. Even arranging this stock in the window in a systematic manner will not sell it to the same extent as giving the display a *proper setting* will.

Few, who are not professional display men, realize the very great importance of the setting. In fact, the chief difference between the work of the novice and that of the professional is often the difference in the setting.

The setting, to be the most effective, should perform two functions: It should attract attention to the window, and it should direct attention to the goods displayed and the reason why they should be purchased. Suppose, for example, that a display is going to be made of anti-freeze radiator mixtures and of radiator covers. If the window is filled with these articles and no setting is provided, that display is not likely to gain more

than passing attention. Few are going to stop and look. Few of those who do stop and look are going to enter the store to buy. The goods have not been given a setting that attracts attention or tends to create desire.

Suppose, however, that we take the same merchandise and give it an effective setting. From white cardboard, we will cut a fringe of icicles which we will place across the top of

of cotton strung on a string and arrange strings of this cotton a few inches apart, up and down, just in front of the background. The window now begins to suggest real wintry weather and the need of laying in winter accessories.

When the goods are placed in this window, more imitation snow can be used. It will also be well to use a radiator and possibly a hood upon which to display the radiator cover. Upon

the hood and the outside of the radiator cover may be sprinkled some imitation snow. Imitation snow may also be scattered over the white cloth or paper.

This window is bound to attract attention on account of the setting. This winter scenery is certain to arouse the curiosity of those who pass by. They will stop and look. Even though it may be a warm day, the setting will suggest that there are cold days

coming and that it will be well to make a purchase at once. The setting, therefore, has directed attention to the goods.

It is not hard to see how many more sales are going to result from this display after the setting has been placed in the window than would have resulted from it if no care and effort had been taken to make a suitable setting.

A setting is not such an expensive thing to install. Usually the total cost is not more than a few dollars a window and the profits on the increased sales that result will always more than make up the difference.

Usually all the material that is



A Well-Arranged Seasonal Window Display that Costs Little to Produce.

the window. We will place in the desired positions—that is, in positions which will make the goods stand out well—the pedestals, boxes and other supports for the goods we are planning to display. Over these supports we will drape white cloth or crepe paper, and over the whole interior of the window we will scatter small puffs of cotton or white confetti.

The window now begins to take on the appearance of winter. It begins to suggest cold weather, and it also begins to attract attention from the people on the sidewalk. To make it appear even more wintry, we can make a background composed of little puffs

needed for making a suitable setting for any window display is a supply of cardboard, crepe paper and common sense. Some artistic sense will help, but common sense is even more valuable. It must be borne in mind that the idea is not so much to make the window look pretty as it is to make it attract attention and to suggest the purchase of the goods displayed.

There is one thing, however, that should be avoided. That is using two or more colors that do not harmonize. Of course, contrasting colors can be used but unless they are used to emphasize certain objects that are being displayed, it is better to confine one's effort to the use of harmonizing colors until he becomes expert in handling colors.

In a number of ways colors resemble musical notes. There are certain simple combinations of musical notes that a person can learn in a few minutes which always harmonize. When a more complicated use of musical notes is attempted, however, the result is sure to be a discord unless the one who makes the combination is an expert musician.

In the same way, there are certain simple combinations of colors which always harmonize, but when one attempts to make more complex combinations, he is in danger, if he is not an expert, of making a combination that presents discords and is not pleasing to the eye. In other words, a combination that tends to repel rather than to attract.

It is for this reason that it is safer for the average person to confine himself to a couple of colors that harmonize when he is making a window setting and decorating the window. It is easier to handle two colors than it is to handle more than two and the result is more certain to be that which is desired.

The two-color combinations of ordinary crepe paper that harmonize are as follows:

White and apple green, black and old rose, gray and old rose, purple and gray, light bluish pink and Nile green, pale coral and sky-blue, medium coral and gray, dark blush pink and leaf green, dark coral and gray, salmon and celestial blue, old rose and leaf green, Nile green and dark brown, emerald green and light amber, dark emerald green and white, grass green and orange, leaf green

and light amber, celestial blue and orange, sky-blue and medium coral, national blue and dark amber, light amber and violet, canary and white, dark amber and national blue, gold and dark brown, orange and gray, light brown and celestial blue, dark brown and national blue, geranium and white, ruby and gray, and apricot and grass green.

This gives a wide enough variety of combination for every purpose. In selecting colors, however, it is well to bear in mind the colors of the goods which are to be displayed. The colors of the decorations should not blend too closely with the colors of the goods.

It must be borne in mind that blending colors camouflage or conceal, while contrasting colors cause objects to stand out vividly, cause them to be

When you would make sales let the customer do a good deal of the talking. Be ready, however, to present your own side of the case at the psychological moment, but do it in as FEW WORDS as you can. Don't use any round-about arguments, involved sentences, and big words. Short sentences, clear ideas and faith in your own proposition, will convince. REMEMBER, COMPRESSION GIVES POWER; EXPANSION DISSIPATES POWER.

displayed. If you are displaying a black object and use white decorations, that object stands out far more prominently than it would if black decorations had been used.

A little experimenting will show which is the best combination of colors to use. Take a group of the objects that you are planning to display and the different color combinations that you have considered using in the window setting. Place the goods in separate groups at one end of the store or other room and behind each group use a different color combination. Then stand back 15 or 20 feet and study the result.

One color combination is pretty certain to be more pleasing when used in connection with these particular goods and to make the goods stand out more clearly. The fact that the windows are to be used for displaying goods must never be lost sight of. For this reason every precaution must be taken

against the least tendency towards using a setting that tends to camouflage them.

All this may seem to be going to an unnecessary amount of trouble, but the setting of the window has the same relation to the sales that will result from the display made in that window, that the dress of a salesman will have upon the volume of sales that he will be able to make. Everyone knows that no salesman can do the best work unless he is properly dressed. His clothing has an influence upon the way his personality affects the prospect and it also affects his own self-confidence. The well-dressed man always feels more confident than the man who is not well dressed.

If a salesman should attempt to make his rounds as scantily dressed as are some windows—in fact, we might say most windows—he surely would be arrested, provided he was not confining his attention to the South Sea Islands or some other part of the world where styles in clothing run to under-dressing rather than to over-dressing. This lack of dress on the part of the window is bound to prove costly in business lost that could easily have been secured through an artistic and attractive display.

Well-dressed windows—that is, windows which are attractively and suitably decorated, that have an effective setting for the displays that are made in them—add much to the appearance of the store. It has the same effect upon the sales that result from the window displays, that good clothing has upon the sales of the salesman.

There is no more reason why a window display should be made in a window that is only half dressed than there is why salesmen should be sent out into their territories clad only in their union suits.

A well-dressed window also has a moral effect upon the owner of the store. He has more confidence in his business ability, he takes greater pride in his store and he makes more money, every year simply because he has given the proper amount of attention to the windows.

Incidentally, the artistically well-arranged windows attract a better class and a more desirable class of customers than do windows, into the setting of which there has not been put so much thought and intelligence.



# "My Boss Is Got Sum Good Ideeahs"

"Say if Ennyboddy in Our Place Pulled Ennything Like That I'll Bet the Boss Wood Throw a Rench at Him or an Ink Bottel or Watever Was Handie—Sumtimes Heze Very Grouchy—But I'll Say Heze Got Sum Good Ideeahs!"

By Frank Farrington

Dear Pete:

Bob, our shop boss, askt me to go over to Dunning's garaje today to get sum kind of stuf hede rote down on a peece of paper. He had to have it rite away. Bob is the best feller in the hole outfit. I woodent hurry a step for that guy Persy.

Dunning's is where we buy things when we get out of em ourselves and have to have em rite off. When they get out of sumthing they cum over and get it from us.

The boss says he bulevs in being friends with your compettiters. I gess heze rite about it too. But I notis they buy more from us than we buy from them. But we dont have enny quarrels with em.

Wel I went in that garaje and handid the peece of paper to a gink there. Heze the one that most always wates on me. Ime glad we

dont have enny such guy in our garaje. Heze worse than Persy.

He lookt at the paper and turned around and hollered to the boss who was showing a car to a man and lady, "George have we got enny of that —?" Ive forgot the name of it, but say, what do you think wood happen if I called my boss George? Of coarse his name aint George, but if it was?

Say if ennyboddy in our place pulled ennything like that Ile bet the the boss wood throw a rench at him or an ink bottel or whatever was handie. Goodnite! Youd looze your job and your back pay. I aint handing my boss enny bokays. Heze the guy that put the ouch in grouch sumtimes, but heze got sum good ideeahs.

He cum in from lunch one day when Persy was tellefoning and he heard Persy say, "How dyou get that

way?—What?—Nope—Nothing doing." He diddent kno who Persy was talking to and he diddent care. As soon as Persy hung up the reseever he told him to cum into the back rume. So I went in the stock rume where you can here thru from the back rume and I herd him telling Persy that he diddent want any more of that ruf stuf over the telephone. "You got to can that ruf stuf," was what he sed.

He sed "I want ennyboddy who

enny thing, but mebbly he knoz when heze balled out.

When I aint doing ennything else its my bizness to watch for fokes to roll up in frunt and want gas or sumthing, and I go rite out to see what theyer after. And when Ime on that job Ile say there dont ennyboddy drive up there and have to stand and wate. I dont have enny trubbel with hookworm or sleeping sickniss. Our familie is all alive, you kno that, Pete,

not ded from the neck up and paralyzed from the neck down like that Persy. When Ive got sumthing to do, I do it on the jump. Ime that way. And I aint conseted about it eether.

This morning a man cum along in one of those chane store to-matoh can gas wagons and wanted to buy a lot of things—a can of greese and 2 spark plugs

and 2 greese cups and a shakkel bolt and I dont kno what all. He had em all ritten down on a peece of paper and I took it in and give it to Josey. Josey is one of our gentelmunly me-kannics and when he has haf a chanse he is the dressiest thing you ever saw.

To see him cumming down to work in the morning, youd think it was his wedding day. I gess he keeps in traning so if he ever catches Dazie, our exkwisit stenografer, when sheze discourraged about getting the boss sined up for a sail on the dismul swamp of mattrimoney, he can lede her to the alter without having to go home to get his Sundie togs—that's what he calls em—togs.

Wel, as I sed, I give Josey the list of things for the man and Josey got em reddy and brought em out. He

(Concluded on page 46.)



calls up this garaje to be ansered in a gentelmunly way. Just cut out that old back lots languag and trete em polite. Mebbly you can get by with that old army talk out in the shop, but when youre in here and tellefoning put up a bluff at being a gentelmun. Get me! This talking over the fone is a different propposition from telling it to their faces. I dont care who it is, be polite to em."

I don't kno what more he sed, but I gess he sed an eerfull all rite and I gess he was rite at that. You can bet I aint going to taik enny chanches when I fone whether the boss is in site or not and I don't buleve Persy is going to maik that brake agen becaws when he cum out of the back rume, I thru a handfull of waist at him and he nevver sed a word. I gess he wasent looking for trubbel. He dont generally kno when heze had enuf of

# The Dealer's Half in Advertising

Over 99 Per Cent of the Dealers Do Not Receive the Fullest Possible Return, Why?—Because the Local Phase of This Selling Is Not Emphasized—Perhaps You Are Doing the Same Thing?—A Few Criticisms That Will Help You

By C. M. Adams

"Under separate cover we are sending you four electrotypes for advertisements to appear in The Oakdale Chronicle, one of your local newspapers. Please deliver them to the publisher and see that they are returned to us as soon as used.

"As we wrote you previously, we will pay for half the cost of this advertising on condition that you pay the other half. Therefore, instruct the publisher to bill us for only half of the total amount.

"Please send us marked copies of issues containing this advertisement.

"Yours truly,

"THE MARVEL MOTOR CAR CO."

Thousands of car and truck dealers have received such a letter as this. Thousands of car and truck dealers have run such electrotyped ads in their local newspapers—good ads, attractive ads; far better in typography and illustrations than the average small-town composing room can produce. But, of these thousands of dealers who have paid half the cost of such advertising, something over 99 per cent have not received the fullest possible return on their expenditure, because the car, and not the dealer, is the item these prepared ads emphasize.

Their general makeup is quite familiar. Measuring, say 8 ins. by 12 ins., the name of the car is blazoned across the top in letters legible across a room, just above a large illustration of the car, below which is a description of the car's advantages, set in type but little less glaring. And at the bottom, tucked as if by an after-

thought into an unused corner, is the name of the local dealer, in type inconspicuous almost to invisibility by comparison with the remainder of the ad. It is almost entirely outshone.

—the man who is being called upon to pay half its cost—this sort of an ad is nearly worthless as a producer of results in proportion to the expenditure which has been made.

The selling of any nationally-known car has two phases—a general and a local. In the general phase, the manufacturer seeks to acquaint the buying public with his car's advantages, and for this purpose he uses space in national mediums—popular magazines, trade journals, class publications, billboards, street-car cards, every legitimate avenue of publicity which will carry the message to the buying public that this manufacturer is producing a car with certain qualifications.

In the second place the dealer attempts to make known to his own local clientele the fact that the car, already introduced by the efforts of the manufacturer, can be purchased at his salesroom.

With this in mind, an examination of the specimen ads which are reproduced will reveal much.

In Fig. 2 the thing that is impressed most vividly on the reader is "Pierce Arrow trucks." Everything else is subordinated to it. Were he to take but a single glance at the ad, "Pierce Arrow Trucks" would be beyond

doubt the only clear-cut impression he would retain.

Now if Pierce Arrow trucks were new; if they were being introduced to a public which knew nothing of their capabilities and performances, this would be not only proper but profitable. But Pierce Arrow trucks have already been introduced. Any

## CHANDLER SIX

*Famous For Its Marvelous Motor*



### The Year's Most Pleasing New Sedan

THE season offers no other sedan so pleasing in the beauty of its lines and its furnishings, as the new series Chandler Sedan. And there is none that may be compared with it at anything like its price.

The new Chandler Sedan is the highest expression of years of development in the creation of closed bodies. It is beautiful to look at, and most comfortable to ride in. It has style and refinement that must appeal to those who care for the finer things.

This car seats seven persons most comfortably or five when auxiliary chairs are not in use. The front seat is solid, not divided as in previous models, and the window posts are a permanent part of the body, not removable. The windows, however, may be lowered away or adjusted to suit the weather and the wish. The entire interior is upholstered in finest quality silk-plush of pleasing pattern for cushions and plain tone for head lining. Interior fittings are in dull silver finish.

Despite the largest production in the history of the Chandler company, the demand for the new series sedan will quickly consume the production for weeks to come. Your early order will be a safeguard against disappointment.

SIX SPLENDID BODY TYPES

Seven-Passenger Touring Car, \$1795	Four-Passenger Roadster, \$1795
Four-Passenger Dispatch Car, \$1875	
Seven-Passenger Sedan, \$2795	Four-Passenger Coupe, \$2695
	Limousine, \$3295

All Prices F. O. B. Cleveland

**THE WELBON MOTOR CAR CO.**  
624 Walnut Street,  
CINCINNATI, CLEVELAND, DAYTON, CINCINNATI, O.  
INDIANAPOLIS

**CHANDLER MOTOR CAR COMPANY, CLEVELAND, OHIO**

Fig. 1.—This Ad Falls to Emphasize the Local Phase of Selling.

Viewed from the angle of a professional advertising man such an ad is excellent, because, as has already been said, the typography and illustrations in addition to the copy itself, are of high grade. Viewed from the angle of the manufacturer, such an ad is also excellent, because it gives his cars valuable publicity. But to the dealer

prospective truck purchaser has had ample opportunity to learn their good points by reading ads in national mediums.

If he has been moved toward a purchase through this source, the next thing he will want to know is the name of the local dealer. Yet in this ad, supposedly designed for this express purpose, "The Cunningham Holmes Co." is practically buried in the profuse display of other matters.

Much of the same thing is true of the specimen shown in Fig. 1, the ad of the Chandler car, by the Welbon Motor Car Co.

Contrast with these specimens, Fig. 3. In this the "Auburn Beauty Six" is given due prominence, but only as the car sold by the Stevenson Bowman Trautman Co. The reader is given the message of both manufacturer and dealer at the same time. He is told not only the machine's advantages but where he can buy it—and that is the true function, the profitable function, of good dealer advertising.

The dealer, no matter how insignificant he may seem, or how small a town he serves, has his following of friends. No manufacturer would dream of distributing through an agency or a dealer which did not have local influence. And this is just the reason why all dealer advertising should be strongly localized.

Department stores which handle nationally advertised hosiery and kitchenware do not devote their entire newspaper space to announcing its merits. Neither does the grocer who handles nationally advertised breakfast food and raisins devote his space exclusively to their praises. They simply let customers whose interest has already been aroused by national advertising know that these goods can be had at their establishments.

To achieve something of the same results, the car or truck dealer must let his own personality appear more prominently in his local advertising. If he is paying for half the space occupied by electrotyped ads supplied by a manufacturer, let him see that



**Count the cost after two years**

THERE are many methods of cost accounting used in figuring maintenance and operating expenses of trucks, but every system recognizes that time spent in the repair shop is a dead loss.

"Money saved" by buying cheap equipment is soon eaten up by the time lost during repairs, to say nothing of the money spent on repairs. The owner is left with an impaired truck that is practically worthless except as a "trade-in" to induce him to repeat the experience.

After one or two experiments like this, most owners learn that built-in quality is true economy and costs less in a very short time.

Owners know the real economy of Pierce-Arrows. On Display at the Auto Show.

**Pierce Arrow**

Delivers more work in a given time;  
Loses less time on the job and off the job;  
Costs less to operate and less to maintain;  
Lasts longer, depreciates less and commands a higher resale price at all times.

**The Cunningham-Holmes Company**  
1187 Gilbert Avenue Cincinnati  
TELEPHONE CANAL 5818.

Fig. 2.—Ad That Subordinates Dealer.

the newspaper publisher sets his name in type of blackness and bigness equal to the name of the car—and if this does not meet with the approval of the manufacturer, let him write an ad which keeps him in at least half the foreground and pay its entire cost himself.

There is no intention here to belittle the advertising material sent out by manufacturers. On the contrary, dealers should give it careful and serious attention. But where they are expected to pay half its cost, and the prepared ad leaves no opportunity for local individuality, it behooves dealers to make the changes suggested.

With the severeness of modern competition to be met, this is the only way in which maximum results can be attained at a minimum of effort and outlay.

#### Permanent License Plan Proves Successful in West.

Considerable agitation has been stirred up in a large number of states by automobile owners over the law requiring them to purchase a new car license and number, the first of the year. The state of California uses a permanent license and number plan which has proved very successful and which might be adopted by other states.

Annually the state issues small seals which are attached to the old plates and indicate that the owner of the car has paid his current license fee. Duplicate identification sheets giving detailed information about the car, the name and address of the owner, are issued with each license. One of these sheets is attached to the car itself.

If a man wishes to sell his car, he must return the identification sheet to the license bureau, which makes a record of the transaction and grants a new license to the buyer. If a man selling a car wishes to buy a new one, he must take his license plate with him and get a new identification sheet. This plan is not only an economical one, but also aids in preventing thefts.

**THE AUBURN BEAUTY-SIX**



INCOMPARABLY beautiful, the *Auburn Beauty-SIX* is the crowning achievement of nineteen years' successful automobile engineering. The *Beauty-SIX* is veritably a novelty at its best—bold, radical and sweeping, yet not freakish in design. It is mechanically correct.

Full comparison by extraordinary first and lasting impression is challenged with any car, regardless of price.

OFFERED IN 5 MODELS WITH SMARTEST COLOR COMBINATIONS.

Five-Passenger Touring Car, . . .	\$1,695	Four-Passenger Coupe, . . .	\$2,375
Four-Passenger Tourster, . . .	\$1,695	Five-Passenger Sedan, . . .	\$2,375
Two-Passenger Roadster, . . .	\$1,695		

SEE THE AUBURN AT THE AUTO SHOW

**The Stevenson-Bowman-Trautman Co.**  
PHONE WOODBURN 4262  
2417-19 Gilbert Avenue Cincinnati, Ohio  
Distributors Ohio, Indiana, Kentucky

Fig. 3.—In This Ad Both Manufacturer and Dealer Are Emphasized.



# The Garageman and Tractor Service

The Tractor Is Here to Stay—Each Year the Demand for Service Will Increase  
—To Be Prepared So That Your Service Can Be Depended On, It Is Essential  
That You Have an Acquaintance with Tractor Operation, Service and Repair

By E. C. Pohlmann

Like the automobile, the gasoline tractor first appeared as a freak, a "will-it-go?" curio, in the days when gasoline engines were the wonders of the times and their designers the geni of the age. But time, the certain developer of the snapshot of a fundamental idea, has placed the tractor of yesterday as the foremost leader of agricultural implements, and today it is making a revolution in farm practice.

Still, there are those who are conservative and will make no definite conclusions concerning the future of the tractor; others believe the tractor is here to stay, just as the automobile, and that each year will find new improvements, cheaper machines, more users, until farming and tractors will be inseparable. But no matter what may be the individual opinion of these men, certain it is that far-reaching developments are imminent.

Right now, however, the manufacturers of tractors are worrying over the service problem to tractor owners and freely admit that if the dealers of tractors could render the service that garagemen render to automobile owners, it would enable them to give more satisfaction to their customers and produce more sales. In fact, many of the manufacturers tell the owners to go to the local garageman when they get into trouble.

It only shows, very plainly, that the garageman is the logical man to render this service; and, it is up to him to study the tractor sale and service problem and give tractor service, not only when called upon, but to go out and get it. Because—when tractors become as numerous as automobiles, then the tractor manufacturers will have had established reliable service for tractor owners. The result will be that they will not only get the tractor repair work, but the farmer's automobile, and truck, and farm-electric repair work as well.

Give this tractor business a little thought. Sit down and balance these facts on the scale of common sense: The tractor is here to stay, just as the automobile and the truck; it is estimated that there were 121,700 tractors in use in 1918 and that in 1925 there will be 2,851,000 tractors at work on American farms.

Who is going to sell the two million tractors? Who is going to repair them? The implement man. He isn't prepared; it requires too much capital for equipment and buildings. He lacks the sales initiative which you have acquired from the sale of automobiles, the "go get 'em" spirit. Besides, you have the necessary equipment

tend to take on the sale of tractors or not, you cannot disregard the service work that you can obtain with little effort and which will help to substantially build up your repair business, and that is the purpose of this and subsequent articles—to instruct the garageman in the essentials and fundamentals of gasoline tractor operation, service, and repair.

To cover this subject of operation, service and repair, enumerating and explaining in detail, pages and pages could be written. There are several hundred different makes and designs of farm tractors, each somewhat different from the other, yet most of them are, in a general way, constructed on the same principles and are subject to the same ailments, at least as far as the engine is concerned, as will be found in the various makes of automobiles. So it will be necessary only to touch on the important things and those which differ from automobile repair work.

## Tractor Operations.

To properly repair and remedy permanently and satisfactorily all tractor troubles, the mechanic or repairman must have a fair understanding of the requirements of a tractor and the conditions under which it must operate.

Briefly, the requirements of a tractor are as follows:

Adaptable: It must perform all kinds of belt and draw-bar work—in fact, operate every machine on the farm.

Correct weight: The weight must be properly distributed and of the right amount for the work.

Large contact area: The traction members must have sufficient bearing surface to avoid loss of power, packing of soil and slipping.

Easy to operate: It must be so designed that it can be easily directed and controlled.

Capable of using any liquid fuel; that is, the engine must be so designed that it can operate on not only gasoline, but also on the cheaper and more plentiful distillates of petroleum.

The tractor is a complex machine. It has many parts that must have constant and intelligent attention. The motor requires constant care. It is subject to overheating, to carbon, and to all the evils of faulty lubrication, which are manifold. The bear-

(Concluded on page 48.)

## The Future of the Tractor

It is easy to remember the first gasoline tractor. Three years ago there were eight, possibly ten, gasoline tractors; eight years ago there were only two gasoline tractors.

But today the labor shortage, and the demand for greater production, make the tractor a farm necessity. This demand, together with the rivalry in standardizing and improving output, and the new grouping of manufacturing interests that is taking place, and the influx of a tremendous volume of new capital and new talent from the automobile organizations into farm machinery manufacture, predict developments which will parallel the growth of the automobile industry.

Today it is estimated that there were about 121,700 tractors in use early in 1918, and that there were 132,697 manufactured during that year, of which 96,470 were sold in the United States. A 1919 production of 314,936 tractors in the United States was estimated. Assuming that the development of the tractor will parallel that of the automobile, there will be at least 1,045,000 tractors made in 1925. This would mean that at the close of that year, after deducting for replacement of worn machines, 2,850,000 tractors will be at work on American farms.

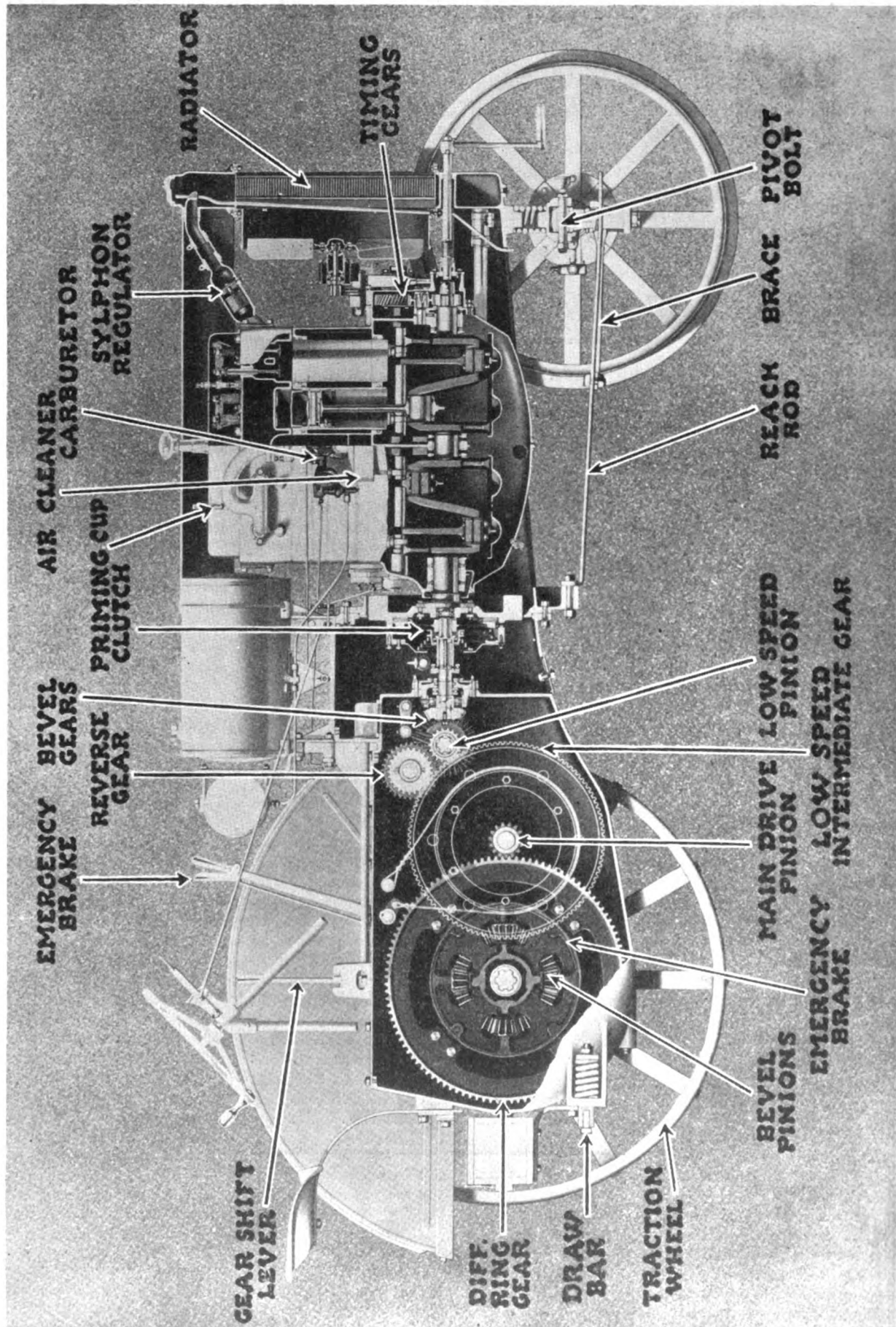
These figures are prophetic, and yet they are significant, because they voice the present and future needs of a basic industry. To those who are to be the mediums of these future sales and the source of service in the thereafter, a portion of these figures represents the profit that the garageman should not overlook.

It is his by right of experience in the automotive business; by right of position, as the source of service; by right of prestige, built through the sales of automotive equipment; by right of ability to handle this automotive work satisfactorily.

to handle the service end with satisfaction. You are ready, you have all the accessories, so to speak.

Keep plugging away at the farmers and you will be surprised at the small effort required on your part, not only to sell tractors, but to get the overhauling as well. Go after this business; it logically belongs to you; it is yours for the asking.

Immaterial, however, of whether you in-



Cross-Section View of Tractor, Showing the Important Parts—At a Glance You Can See That It Is Very Much Like the Cross-Section of an Automobile.

# Repairman's Tractor Trouble Chart

## Engine Refuses to Start.

1. No gasolene—line closed or tank empty.
2. Forgot to prime engine with gasolene.
3. Weak mixture—not enough fuel in carburetor, not adjusted properly, or throttle not open enough.
4. Engine primed too heavy.
5. Water in fuel.
6. Kerosene in bowl instead of gasolene.
7. Air leaks in manifold.
8. Atomizer clogged.
9. Vaporizer at stop position.
10. Sparks too early.
11. Dirty sparkplugs, or one or more broken.
12. Contact points on sparkplugs too far apart.
13. Broken wire or loose terminal.
14. Short circuit in primary or secondary.
15. Film of moisture on sparkplugs from rain or condensation over night (dew) of water in the atmosphere.
16. Moisture in distributor box.
17. Impulse starter stuck or spring broken.
18. Magneto contact points obstructed by foreign matter.
19. Breaker points pitted.
20. Vibrators adjusted too closely.
21. Water or congealed oil on commutator.
22. Wires on wrong plugs.
23. Ignition not timed properly after overhauling.
24. Lack of water in air washer (Fordson).
25. Working parts of governor sticky—need cleaning and lubricating.
26. Governor control rod too long or short and binds.
27. Weak compression due to worn piston rings, or cylinder; valves need grinding.
28. Stuck inlet or exhaust valves.
29. Valves not timed properly after overhauling.
30. Water leaking into cylinders.

## Engine Misses—Irrregular Action.

1. Engine not warmed up sufficiently.
2. Fuel mixture too lean.
3. Fuel mixture too rich.
4. Feeding too much water.
5. Water in fuel.
6. Dirt in needle valve.
7. Clogged fuel line.
8. Intake manifold leaks.
9. Worn carburetor needle.
10. Air-valve spring weak or broken.
11. Obstruction in intake manifold.
12. Air cleaner not working properly.
13. Leak around sediment trap.
14. Fuel pump not working properly.
15. Burnt out vapor tube from burning gasolene and not having shunt valve on "off" position.

16. Sparkplugs dirty or one or more broken.
17. Loose terminal.
18. Partially broken wire.
19. Poor contacts in breaker box.
20. Carbon in distributor box.
21. Coil vibrator not properly adjusted.
22. Commutator contact imperfect.
23. Moisture short-circuiting sparkplugs in rainy weather.
24. Distributor lifter not operating properly.
25. Wobbly circuit breaker.
26. Engine overheated.
27. Governor out of adjustment.
28. Sticky exhaust valve.
29. Leaky intake valve stems.
30. Valves not timed correctly.
31. Too much clearance between valve stem and tappets.
32. Cylinder-head gasket defective.
33. Irregular action when idling results when engine does not generate enough heat to properly vaporize kerosene. Shift to gasolene and retard spark.
34. If engine misses and the following explosion in the cylinder is accompanied by an explosion in the muffler, the ignition is usually at fault.

## Engine Overheats.

1. Over-retarded or weak spark.
2. Too rich a mixture.
3. Overload on engine.
4. Excessive carbon deposit in combustion chamber.
5. Not enough water in radiator.
6. Radiator partly clogged with sediment.
7. Cooling system pipes clogged by deterioration of rubber hose or gaskets.
8. Lime or other deposit in cylinder jacket.
9. Formation of scale on walls of cylinder jacket, especially when spring or well water is used.
10. Fan belt slipping.
11. Lack of sufficient lubricating oil.
12. Oil circulating pump not working properly—broken spring or valve; obstruction in pipes.
13. Oil leaks.
14. Low speed when centrifugal pump is used.
15. Defective or worn-out water circulating pump impeller.
16. Lubricating oil diluted with kerosene and water which worked past piston rings.
17. Oil deteriorated or worn out.
18. Water pump leaking air.
19. Incorrect timing of valves.
20. Restricted exhaust.
21. Fan blades distorted and do not have enough pitch.

## Pounding and Other Noises.

1. Spark too far advanced for load.
2. Pre-ignition due to insufficient or no

water supply to fuel mixture. This is indicated by a dull knock.

3. Overload on engine.
4. Excessive compression due to accumulation of carbon in combustion chamber. This knock is a clear hollow sound most noticeable when pulling hard, especially when engine is heated.
5. A clattering pounding, like the distant tapping of steel with a small hammer, twice every revolution and increasing with speed is indication of a loose connecting-rod bearing. It is readily distinguished when motor is idling or upon speeding up and suddenly closing throttle.
6. A hollow sound like a thud, every revolution when the engine is pulling hard, is indication of a loose main bearing.
7. Piston slap. This knock is indicated by a rattling sound, especially heard upon suddenly opening the throttle.
8. Piston rings loose in grooves.
9. A distinct metallic sound, like a click when suddenly accelerating, is indication of a worn upper connecting-rod bushing.
10. Loose wrist pin.
11. Worn cylinders.
12. Loose gear in gear case in front of motor.
13. Worn camshaft bearings.
14. Crankshaft sprung and piston striking cylinder head.
15. Metal clicking or rattle is indication of too much clearance between valve stems and tappets.
16. Loose pulley.
17. Loose flywheel.
18. Squeaky noises indicate dry bearings, dry cylinders, piston rings (after installing new rings) too tight.
19. Whistling or blowing sounds indicate leaks around exhaust manifold flanges, valve caps, sparkplugs, pet cocks, etc.
20. Grinding and humming noises indicate that gears are meshing too deep, or lack of lubrication. Clattering of gears indicates that they are worn or not meshing deep enough.
21. Noises in general and squeaks indicate loose parts on running gear, pans loose, starting crank rattling in holder, etc.

## Loss of Power.

1. Mixture too lean.
2. Mixture too rich.
3. Weak spark.
4. Spark retarded too much.
5. Spark advanced too much.
6. Air cleaner leaks.
7. Tight bearings.
8. Cylinder-head gasket leaks.
9. Valve-head gasket leaks.
10. Sparkplugs leak around threads.
11. Defective priming cock.
12. Governor not working properly.
13. Engine overheated due to poor lubrication or faulty cooling system.

(Concluded on page 50.)

# Accounting: The Sales Tickets Should Show All Details—It Is Not Necessary to Show More Than the Ticket Number in The Sales Journal to Key Transaction—Many, However, Like to Make Detail Record of Sales—Method of Doing This Explained With Sample Sales Journal Sheet

By J. Newton Boddy, *Manager,*  
*System and Loose Leaf Department, Jeffrey & McPherson Co., Minneapolis*

All entries to the sales journal should come from sales tickets. As the sales ticket should show all details, it is not necessary to show more than the ticket number in the sales journal to key the transaction. However, many garagemen like to make a

ments. But as any two seldom handle the same lines, to make the journal standard, the departments are classified alphabetically. The classification is used for the purpose of demonstration, as follows:

*A, new cars; B, used cars; C, gaso-*

now read as shown in the following illustrations:

No. 659, Harry Jones:

1 Studebaker car, Model  
 E. C. .... \$1,400.00  
 War tax ..... 70.00  
 Carrying charges ..... 70.00

MONTH November, 1917				SALES JOURNAL											
DAY	ITEM	ACCOUNTS RECEIVABLE DEBIT	CASH SALES CREDIT	NOTES RECEIVABLE DEBIT	MERCHANDISE ACCOUNT	DEBIT	MISCELLANEOUS ACCOUNT	DEBIT	WAR TAX CREDIT	CARRYING CHARGES CREDIT	MISCELLANEOUS ACCOUNT	CREDIT	COST	SALES CREDIT	COST
3		*659		125.00	Used Cars	400.00			70.00	70.00				1400.00	1120.00
		660	550.00	490.00					50.00					990.00	802.00
		661	600.00	660.00					60.00					1200.00	912.00
		662		2.30										2.30	1.90
		663	43.00											43.00	31.50
		664	5.00											5.00	
	Storage	665		5.00										5.00	
		666		13.70										13.70	7.40
		667		2.00										2.00	.75
		668		12.00										12.00	4.00
		669	150.00	200.00										350.00	375.00
TOTAL PAGE		1348.00	1510.02	1015.00		400.00		180.00	70.00					4023.02	3262.55
TOTAL FORWARD															
TOTAL DATE															

Sales Journal Sheet Showing Entries of Sales As Enumerated in the Text.

detail record of sales in their sales journal and, therefore, transcribe their sales to their sales journal. The writer believes the supposed advantages of this method will not compensate, to any extent, for the wasted effort in duplication.

If sales tickets are properly filed, they make just as ready a reference as the sales journal. It will be noted that in illustrating the sales journal, the departments, such as *A, B, C, D, E, F, G, H and I*, have been set up, with a miscellaneous column to take care of extras. Reference to the August article will indicate the reason for doing this.

In merchandise and sales accounts 18 departments have been shown. The average garageman, however, will have not more than nine active depart-

lene; *D*, oil and grease; *E*, tires and tubes; *F*, parts; *G*, supplies and accessories; *H*, labor; and *I*, storage.

To these is added "Miscellaneous," or *J*, to take care of infrequent sales or inactive departments.

If proper sequence were observed, the cash journal would be the last journal of record to be explained. It was taken first because it is the most important record and the backbone of any good accounting system. For this reason, the author finds it necessary to add considerably to the transactions which were posted from the sales journal and also to alter the ones in which war tax appears.

The maximum war tax is 5 per cent and as you will notice, we will have to raise our sales to show \$180 war tax. The entries on our sales tickets will

Credit by cash...\$ 125.00  
 1 Used Reo..... 400.00  
 12-payment note. 1,015.00  
 No. 660, Frank Smith:  
 To 1 Dodge car...\$ 990.00  
 War tax .... 50.00  
 ----- \$1,040.00  
 By deposit .....\$ 150.00  
 By cash ..... 490.00  
 ----- \$ 640.00  
 Balance on account..... \$ 400.00  
 No. 661, Geo. Kay:  
 1 Studebaker, Model E. C. \$1,200.00  
 War tax ..... 60.00  
 ----- \$1,260.00  
 By deposit .....\$ 200.00  
 By cash ..... 660.00  
 ----- \$ 860.00  
 -----  
 Balance due ..... \$ 400.00



If your sales are not numerous and your daily transactions do not average over 30, the sales journal may be dispensed with and the transaction posted in exactly the same way in the

**Other Half of Sales Journal Sheet Showing Detail Record of Sales As Enumerated in the Text.**

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# Practical Hints for Shop Mechanics

Conducted by E. C. Pohlmann

## Work Card Holder.

Mislaying of the workman's work card can be prevented by means of a holder made from a thin sheet of metal cut the length of the card, with the edges turned over, securing the card in place.

This arrangement also affords a smooth, hard backing to write upon. A strap can be fastened to the back of this holder so that it can be slipped over the hood or windshield.—S. C.

\* \* \*

## Upholstery Renovating.

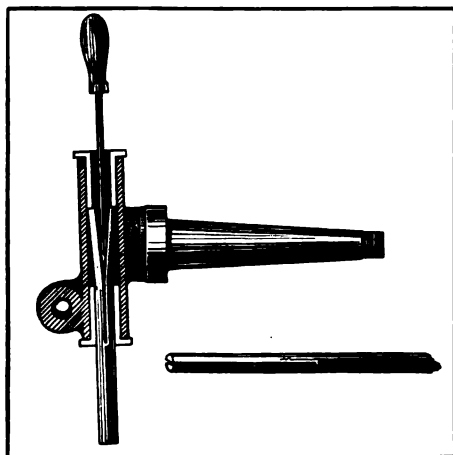
The result of using upholstery for some time is a packing of the hair which thereby loses its life or resiliency. The necessary treatment is to "re-tuft" the hair. To do this, remove the hair and put it through a combing operation. This work is usually done by hand methods, but can really be accomplished with a home-made device which saves considerable time.

Construct a drum about 18 inches in diameter and cover it with spikes about  $\frac{3}{4}$ ths of an inch in length. Place two small rollers just clear of the spikes, through which the hair is to be fed to the drum. The drum, revolving at a high rate of speed, will tear the hair away from the rollers as the spikes rush by, thereby loosening up the hair. The drum can be rotated by machinery, or by hand with a crank about a foot long and a triple train of gears.

\* \* \*

## Spindle Bushing Remover.

A very good Ford spindle bushing remover can be made from a 7/16-inch rod or bolt eight to ten inches long, split



Handy Spindle Bushing Remover.

lengthwise three inches with a hack saw. To remove the bushing, wedge a screw-driver (as shown in the illustration) in the slot, to spread the ends and prevent slipping, and drive it out.—B. J. B., Ia.

## ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical. Tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction, a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

## Shears for Cutting Wire.

A pair of shears can be very easily converted into wire cutters by grinding or filing a groove, as shown in the illustration.

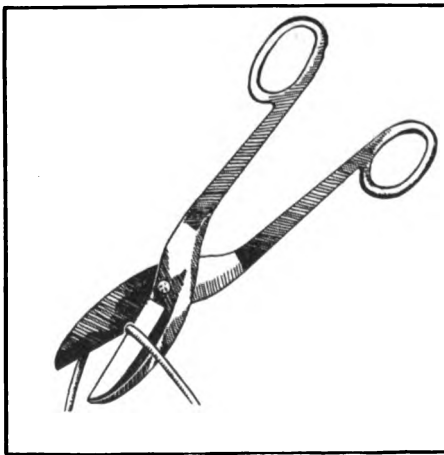
This tool is especially handy when making electrical connections because it can be used for cutting the wire, and, the shears proper, for the insulator and tape.—M. P. B., N. Y.

\* \* \*

## Lubrication Hint.

Trouble is often experienced with over-lubrication of the front cylinder of the Ford car, the oil forcing its way past the piston rings and causing excessive carbon. This is due to the connecting rod of the front cylinder dipping too deeply into the oil. A cure is suggested as follows:

Level up the crankcase, by raising and



Cutting Wire With Shears.

blocking up the front end of the motor. This is accomplished by placing a pad under the crankcase front-frame bearing. If there is a decided pitch to the crankcase, it may be necessary to use a block

that will require longer spring clips. The alignment of the motor will not be affected.—F. H., N. J.

\* \* \*

## Cleaning Valve Stems.

A very simple way to clean valve stems which are under suspicion as harboring carbon deposits is to inject a little kerosene in the air valve of the carburetor while the engine is running.

In this way a little of the kerosene finds its way down the valve stem and softens and washes off the carbon. It is a good idea to clean valve stems about once a month.—B. H., Va.

\* \* \*

## Drilling Glass.

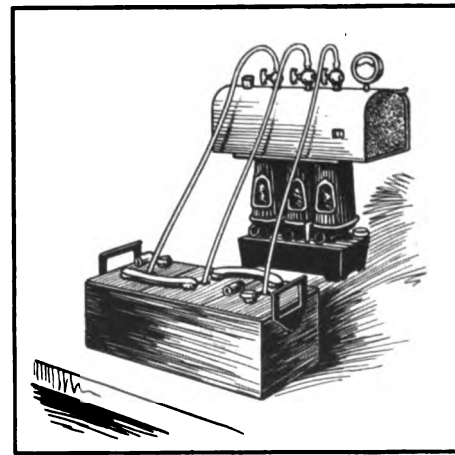
To drill holes of any size in glass, proceed as follows: Get a small, three-cornered file and grind the points from one corner and the bias from the other and use it for drilling with an ordinary brace.

Lay the glass which is to be drilled on a smooth surface covered with a blanket and begin boring the hole. When a slight impression is made on the glass, place a dish of putty around it and fill with turpentine to prevent too great heating by friction. Continue boring the hole, which will be as smooth as one drilled in wood with an auger. Do not press too hard on the brace while drilling.—T. K., R. I.

\* \* \*

## Battery Steamer.

A very simple and easily made battery steamer is shown in an accompanying illustration. It is made from a rural mail box into which have been soldered a filling cap, a steam gage and three drip cocks.

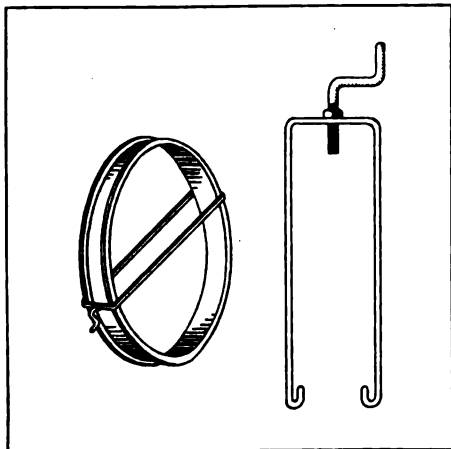


Simple Battery Steamer.

From the drip cocks as shown,  $\frac{1}{4}$ -inch rubber hose is connected to the battery filling caps. The steam is generated by means of an old two-burner stove.—W. J. P., Mont.

### Setting Tire Rims.

To set tire rims on wheels, clean off all rust and wedge spoke tenons. Then measure the wood rim and iron rim with a tire-measuring tool and cut out a piece  $\frac{3}{16}$ th



Clamp for Setting Tire Rims.

of an inch so as to make the iron rim smaller than the wheel.

Then using the clamp shown in the illustration to keep the rim together, weld the joint. Be sure and smooth up the weld so as to prevent it from cutting the inner tube.

Heat the tire rim and put it on the wheel the same way a wagon tire is put on, cool it off in water and you have a real job.

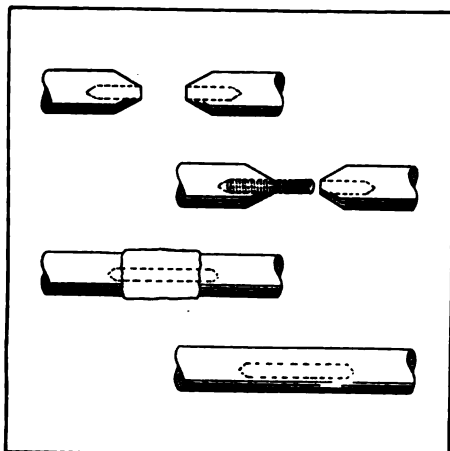
The clamp which is very necessary in order to do this job is made from  $\frac{1}{4} \times \frac{1}{4}$ -inch flat iron. The crank is made from  $\frac{1}{2}$ -inch round iron and the nut is welded to the flat iron as shown and threaded.—W. J. P., Mont.

\* \* \*

### Crank Shaft Welding.

In the accompanying sketch are shown the various steps in welding a crank shaft.

The first step consists of drilling and



Method of Welding Crank Shaft.

tapping pieces of the broken shaft, then insert stud and finally make the weld. I know that most welders do this work in a similar way, but I have had such success repairing crank shafts this way that

I am passing it along for what it is worth.—M. H., N. Y.

\* \* \*

### Repairing Curtain Windows.

This is the time of the year to repair broken curtain windows and the following is an easy and satisfactory method of doing the work:

The windows are sewed in with a double row of stitches. Cut the inside row of stitches, leaving the second row. Next cut out the broken light, leaving a strip about half an inch wide all around and held in place by the row of stitching which should be left intact.

Now cut the new pane the right size and cement it to the edges left on the old pane. The cost of replacement of a window in this way is less than a dollar.—D. P., Mich.

\* \* \*

### Soldering Kink.

To prevent the hot soldering iron from burning the bench and starting a fire, use a washer as shown in the accompanying illustration.

In order to place this washer on the rod, the handle will have to be removed.—M. B. B., N. Y.

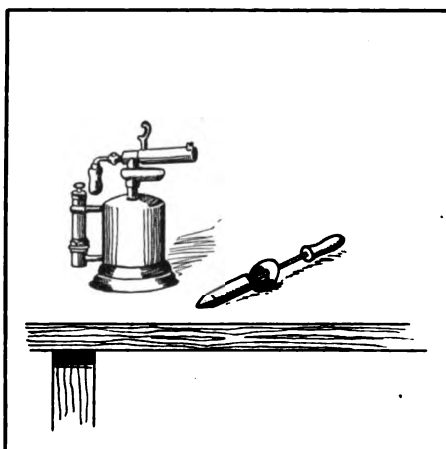
\* \* \*

### Light for Car Washing.

In setting aside a portion of the garage or workshop for washing cars, the owner should not fail to arrange for the best of lighting, as careful and thorough work of this nature depends largely upon such facilities.

It is a good idea to have the lighting arrangement adjustable. This can easily be done by attaching the lights to a wooden bar about 10 feet long and 8 inches wide, and painted white so that it will act as a reflector.

This bar should be supported on two arms and each arm should be fastened to the ceiling beams with a carriage bolt



Supporting Soldering Iron on Bench.

through the arm and the beam, hinge-like. Then fasten a rope to the center of the bar and run it over a pulley in the ceiling to a place which can be conveniently reached by the operator.—C. G., Ill.

### Tool for Turning Crankshaft.

A very handy tool for turning Ford crankshafts after the flywheel has been removed, can be made from a lever off an old junk moving machine which usually is



Tool for Turning Crank Shaft.

around the shop or can easily be obtained in the neighborhood.

Drill two holes  $\frac{3}{4}$  ins. apart, as shown in the illustration, and rivet two  $\frac{7}{16}$ -inch dowel pins in these holes. This tool is very satisfactory for turning Ford crankshafts when tightening bearings after the flywheel has been removed.—E. M. B., Ind.

\* \* \*

### For Filling Holes.

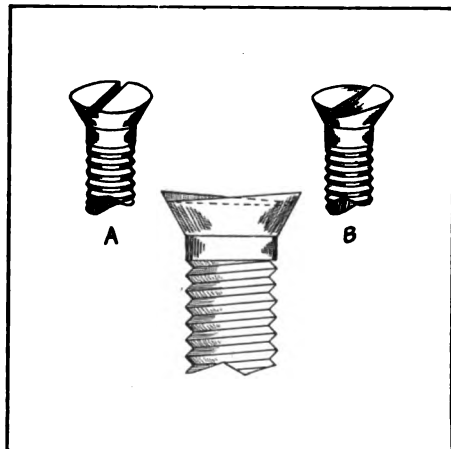
A metal which is valuable for filling holes in castings is made as follows: Nine parts of lead, two parts of antimony, and one part of bismuth. This metal will expand on cooling.—R. J., Ala.

\* \* \*

### Locking Tool Chests.

Tool-chest lockers, instrument cases and doors to lockers, rooms, etc., can be made burglarproof by filing the heads of the screws in the hinges as shown in B.

This will allow one to tighten the screws,



Method of Filing Screw Heads.

but prevents them from being removed by persons who are in the habit of helping themselves to things that strike their fancy. This is a very good method of making a tool chest burglarproof.—M. P. B., N. Y.

# The Use of Special Lathe Attachments

To Use the Tapering and Milling Attachments Requires No Extraordinary Ability—Making a Rear Axle from Stock Material—How to Use the Tapering Attachment—Cutting Keyways and Squaring with the Milling Attachment

By J. N. Bagley

If one were to carry in stock all the repair parts for the different cars that come to his place for repairs, he would have a large amount of money invested, and also have a stock that might never be used. In the neighborhood there might be a couple makes of cars, two or three commercial trucks, etc., and to just carry a stock of axles and transmission shafts for these would require considerable capital. If the repairman is to expect business, he must be prepared to give prompt service, and he can hardly expect to do it if he tears a car down and leaves it stand in the workshop, while he orders the repairs from some agency.

The writer has found that the better way is to have the necessary equipment for making some of these repairs on short notice, and give the customer service that will be appreciated. For instance, a customer calls up in the morning, about 8 or 9 o'clock, and asks you to come out and pull him in.

After bringing him to the shop you find that he needs a new axle. You are able to take the raw stock for an axle over to the lathe and in the course of three or four hours are ready to turn the car over to him to drive home. You have given service that will be appreciated; you have made a customer who will stick by you as long as you are in business. On the other hand, if you tear the car down and say to him, "Bill, you've a broken axle and it will take a couple of weeks to get one, as I will have to send to the factory," the chances are that the next time he needs the car repaired, he will try some other garage where he can get quicker service.

The necessary tools for making the parts just mentioned will require no elaborate outlay of cash and can be operated by any one with ordinary mechanical ability. When the tools are installed, they can be used for many miscellaneous jobs. In fact, you will not be able to tell, for the life of you, how you got along without them before. A lathe, of course, will be necessary, with a milling attachment, a few milling cutters and an arbor for holding the wheels—all of which will cost possibly \$350.

On first thought you will say: "I can't afford it; besides, it would not pay to have money invested in equipment of this kind."

But before you make a definite decision, let us reason it out from a standpoint of dollars and cents, and see just how much

it will earn—that is the only way to judge the value of anything you buy as an investment. The writer recalls instances where over one hundred axles of various kinds have been made in one garage during a single year. The price of the axles ranged from \$4.50 to \$10. Of course, some of these axles were made for garage owners in neighboring towns, but they were made just the same.

Just for the sake of argument, we will place the value of the equipment at \$400 complete; figuring the interest (in case the money is loaned), at 8 per cent, or \$32 for the year. We will average the stock for which the axles are made at  $1\frac{1}{4}$  inches, costing per axle \$1.20. Some, of course, will be a trifle larger and much of them smaller, but this will be a fair average.

The finished axle is worth from \$4.50 to \$10, and it takes from two to  $3\frac{1}{2}$  hours to make it, depending somewhat on the style of the axle. Figure the labor of making the axle at \$1 per hour, which is about right, and we have labor and material about \$3.20. Say you get \$5 for the

ment of this kind in the garage if properly handled. However, the investment should be made wisely—that is, do not buy a large 24-inch lathe where a 13-inch one will answer just as well. Judge the use you have for the lathe and buy accordingly.

In case there is in your territory large machinery, such as threshing machines, tractors, etc., and you expect to get a share of this business, buy your lathe large enough to handle the work. In some sections of the country, tractors are quite numerous—in fact, the repair business and winter overhauling is quite an item. All these things should be taken into consideration when making the purchase.

The lathe after a year of use will show practically no wear, if it has been taken care of and properly oiled. The same power that is used for the air compressor, grinder, etc., will handle it very nicely and there will be no extra power plant to buy. Buy a lathe with a full set of gears for thread cutting, as many threads can be cut with the lathe that cannot be cut with the die, and, besides, if you were to invest in enough dies to cut all the different sized threads you have to cut, you would have half the price of the lathe equipment in taps and dies alone.

In Fig. 1-A, we have a drawing of an axle of the very common type and not at all difficult to make. This axle, *A*, has a square at one end, *B*, which slips or fits into the square hole in the differential gear. The other end, *C*, is tapered to fit into the taper hub and is supplied with a key seat, *D*, to key the wheel to the shaft and prevent it from turning inside of the hub. The end at *E* is threaded for a nut which prevents the wheel from working off the axle and also prevents the key working out of its seat. At first it may seem a trifle difficult to turn this taper on the end of the axle and square end. Then there is the keyway to cut, a hard job you will say at once if you never cut one on a lathe, but it is very simple.

We will first take the taper of the broken axle as shown in Fig. 1-B. Laying the straight edge, *B*, on the shaft as shown, we find the taper is 4 inches long and the space at *D* is one-quarter of an inch. Now let's see how difficult it will be to find how far over to set the tailstock of the lathe to cut this taper.

Referring to Fig. 2, we have measured back from the end where the taper starts 4 inches, as shown at *D*. Set the tailstock

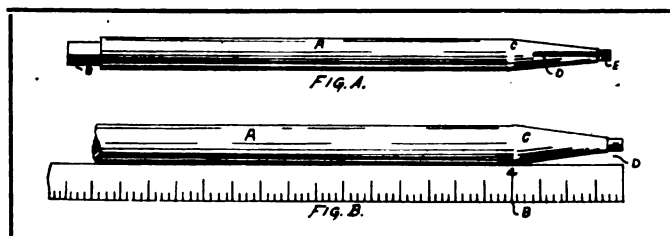


Fig. 1.—Common Type of Axle and Method of Measuring Taper.

axle, which would be a fair price; you have made a profit of \$1.80 besides the \$1 per hour for your labor.

We will consider 30 axles during the season, a very low estimate, and you have a \$60 profit on the axles, and from 60 to 75 extra hours labor at \$1 per hour.

Since you have the necessary equipment, you can make piston rings, piston pins, and small bushings every day in the year. Besides the \$32 interest, you will very nearly pay for the equipment the first year, and not only that, you have taught your trade that when they come to your shop with a piece of work, they will get it on scheduled time.

This service these days is what gets and holds trade, be the town large or small, for the car owners will take their work to the larger place if the man in the small town is not in a position to give satisfactory service.

There is no argument against an equip-



over until we can start the cutting tool, *E*, at the outer end, and in running it four inches have a space of one-quarter of an inch between the shaft, *A*, and the point of the cutting tool, *E*. Then set the tailstock over to take up this space and tighten the screws in the tailstock block, *F*, to hold it secure.

The movable center in tailstock *C*, should be adjusted just tight enough so that there is no play of the shaft between

same time drawing the cutting tool away. When the cutting tool has returned to the starting position, reverse the direction of the spindle again and at the same time set the cutting tool to the work. Continue this operation until the thread is sharp at the top. Try the nut for fit, and if you have the diameter of the shaft correct before starting to thread, the nut will screw on very nicely.

Care must be taken in setting the thread-

milling wheel arbor shown at *B*, Fig. 5, and space the wheels, *A*, with the rings, *C*, to be just the exact distance apart for the square. Tighten nut *E* while holding the rings in position, and suspend the entire assembly between centers *G*.

Place the shaft in the vise of the milling attachment and adjust it to the cutting position. Arrange the speed of the cutter so that it will cut clean and smooth and not heat, and then proceed to cut the

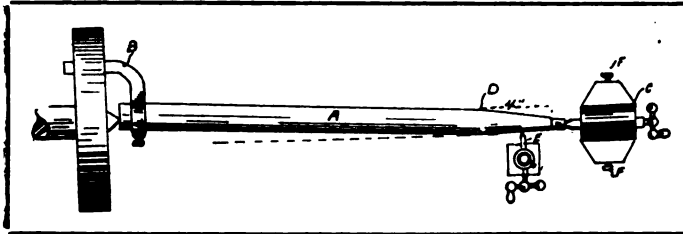


Fig. 2.—Turning Taper With Lathe Attachment.

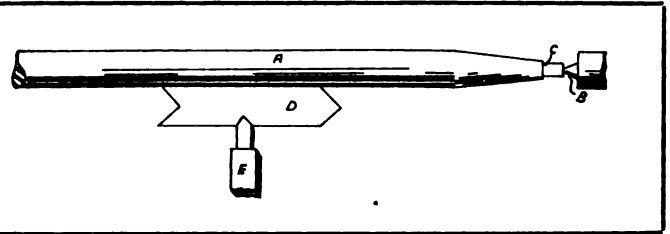


Fig. 4.—Setting Tool With Thread Gauge.

centers. Tighten the screw holding the lathe-dog to the shaft as shown at *B*, and we are ready to turn the taper as in ordinary turning.

The first cut will run but a short way along the shaft, while the next will run a trifle longer, and so on until the four-inch mark is reached, then the shaft will be tapered just right and will be ready for the keyway.

Next in order is the thread. The first thing necessary will be to adjust the tailstock center to its central position. This can be done by loosening the screws, *F*, and slipping the tailstock along up to the live center and watching the two centers. Slide the tailstock back and again place the shaft as before, and it is in position for the threading operation. Take the measurement of the outside diameter of the threads on the old axle as shown at *A*, Fig. 3-A, with the calipers, *C*. Transfer this measurement to the new axle and turn it to size.

The next operation will be to find the

ing tool to get a clean, even cut. In case the tool is too low, the cutting will be heavy and irregular; if too high, the cutting edge will be above the work and will crowd the shaft away instead of cutting it. The smaller the work the faster it can run and the cleaner the cut.

In setting the lathe tool care should be taken to get it set square with the work or the thread, when cut, will lean one way or the other, so to speak. In Fig. 4, we have at *A*, a shaft suspended between centers *B*, and the end to be threaded at *C*, parallel with shaft, *A*. The thread gauge, *D*, comes in very nicely at this time for setting the tool. Back the tool away from the work far enough to permit the gauge being placed against the shaft as shown and the tool forced into the V-notch.

When the cutting tool fits the notch exactly, it indicates two things in particular—the pitch of the cutting edge is correct and the tool is set correct for the cutting. This little tool is inexpensive and should be added to the equipment, for it is invaluable

square. As soon as the cut has been made, turn the shaft one-quarter over and make the second cut and the square is made.

The keyway can be cut in the same manner, or it can be cut with a small cutter for the purpose held in the chuck, but the same device with a suitable wheel will be found very satisfactory. The axle should be chucked in the vise of the milling attachment, so that the cut will be the same depth at either end. In cutting a keyway, the entire depth should be made in one cut, because the cutter will work much better than it will in making two or three light cuts.

There are two grades of cutting wheels—high-speed steel and carbon steel. The carbon steel answers very well for a low-priced cutter.

The making of the axle is a very simple operation, as has been shown—nothing complicated about it whatever. After you have made a few axles and become familiar with the working of the machine it will

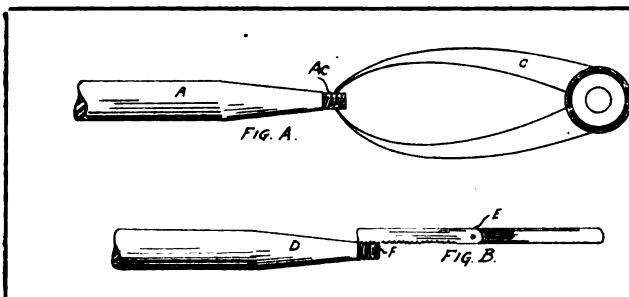


Fig. 3.—Measuring for Cutting Threads.

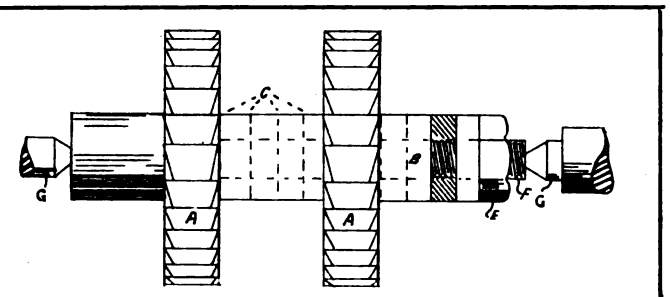


Fig. 5.—Milling Attachment in Place.

number of threads to the inch, in case it is not already known. Take the thread gauge, *E*, Fig. 3-B, and place it on the threads, *F*, of the axle, *D*. Note the number of threads to the inch and change the gears on the lathe to cut the desired threads.

Start the cut at the outer end and when the cutting tool reaches the shoulder, reverse the direction of the spindle, at the

for getting the correct pitch for grinding the lathe tool both for inside and outside work. It can be used for setting the tool for either inside or outside threading.

Now that we have the thread cut and the taper turned, the next step is the cutting of the keyway and squaring the end, in case it should be squared. Remove the compound rest from the carriage and bolt the milling attachment in place. Take the

surprise you how quickly you will be able to turn out a finished axle. In fact, you can make an axle as soon as the car can be taken down.

A very good plan is to take the measurement of all the broken axles that come to the shop and file them away for reference. When an axle must be made, one man can start the new axle while another man is taking the old one out.

# An Unusual Case of Compensation

Is a Frozen Toe Compensable?—Is Pneumonia Compensable?—It All Depends on Whether Exposure Is Superinduced by Employment—Such Things Have Occurred While Moving Shop and Equipment—Read What the Courts Hold

By Chesla C. Sherlock

It was a happy day among the boys in the old Sanderson garage when Sanderson again obtained control of it. Mr. Webb, the young man from Chicago, who had bought the shop from Sanderson the summer before, was not a match for the jovial Sanderson, since the latter had taken over the garage "across the alley."

In the course of time, Webb's wife developed poor health and the former willingly sold out to the old owner. The boys held a sort of jubilee meeting the morning when the news of the transaction was broken to them.

But Sanderson was not idle long. His dancing eyes were soon roaming here and there over the old shop. The corners of his mouth tightened a bit, as decision came into his features.

"Boys," he said evenly, "the first thing we'll do will be to move across the alley into the new shop. We've got better quarters there, more room, and better lighting facilities. I've put too much money into that shop to abandon it just now. So the old place will have to close its doors."

Those who have had to "move shop" know that it is actually "easier said than done." What might appear to be a comparatively easy task soon lengthens itself into days and days.

So it turned out to be, in moving the old stock into the new shop. Besides, it was necessary to make a careful inventory of Webb's stock of goods, and to rearrange things in the new Sanderson shop in order to make room for the incoming material. This all took time, and the fact that it was in the dead of winter did not add to the speed with which it was accomplished.

In order to make the task of moving lighter, the things were simply taken across the alley. The huge doors on the rear of the two establishments were kept open practically all of the time.

Harry Ford, who had become foreman of Webb's shop, was put in charge of the moving by Sanderson, who was now largely engaged in mapping out plans for the coming drive

for bigger business in all departments.

Ford spent most of his time in the alley between the two garages. He was well bundled up, due to the cold, as were the other men—but you know how hard it is to work in heavy clothes.

Most of the men ignored the cold in order to work with greater freedom and many removed their outer garments. One day, when they were engaged in moving the cars which were to be repaired from the old shop, a task that took a great deal of time, the thermometer dropped down to 20 below zero and hung there all day.

The open doors of the two shops made heating impossible. It got so cold that Sanderson closed up shop, sent his stenographer and bookkeeper home and busied himself helping the men, in order to get the moving done as quickly as possible.

One dismantled machine, which the men were attempting to move on a truck, slid off in the alley and it took nearly two hours to get it back and into the new shop.

Harry Ford went home that night chilled to the bone. In spite of hot-foot baths and mustard plasters and all the "old standbys" Mrs. Ford could think of, fever rose steadily in him and he went to bed a very sick man. In two days pneumonia developed and his life hung like a feather between life and death.

George Peck had a badly frozen foot and subsequently suffered the amputation of the great toe. He was also annoyed with a severe cold which threatened pneumonia for weeks.

Others among the men had colds but succeeded in getting over them without serious complications. Curiously enough, Sanderson himself had a close shave with pneumonia.

In the course of time, when Sanderson got around again, he went down to see Harry Ford, who was still a very sick man. "It's all right, Sonny," he said, "don't worry. Our insurance will take care of the doctor bills and you'll have something coming besides. I forwarded a claim a

couple of days ago for you and George Peck."

This cheered Ford and his faithful wife somewhat, for they did not know that the workmen's compensation insurance would cover such a case, although they knew that Sanderson himself would be liberal enough.

In the course of a week the insurance company's adjuster walked into the office. "Came down to get the straight of the Ford and Peck cases," he explained, bluntly.

Sanderson's eyes narrowed. There was something of a glint in them, as he snapped: "Sit down!"

Quickly, briefly he gave the facts. There was an unmistakable hardness in his tone. When he finished, he poised his cigar belligerently in the corner of his mouth, thrust out his chin defiantly, as if to say: "Now, deny liability, if you dare!"

The adjuster coolly regarded the burning end of his cigars, leaned back in his chair and said: "Well, if that is the case, I guess I'd better climb on the next train and go back home—after giving you these checks for Ford and Peck." Sanderson relaxed a bit and smilingly took the offered checks.

"You know," continued the adjuster, "our liability for frostbite or exposure due to the cold, stands on a mighty narrow point and I had to be absolutely certain as to the facts in the case before we could assume liability. Nine times out of ten an injury due to frostbite is not compensable, as it occurs under circumstances making it a risk of the commonality, rather than one peculiar to the workman's employment."

"As to the Ford case, his pneumonia is clearly the result of unusual exposure superinduced by his employment. While pneumonia is ordinarily not an accident within the meaning of the compensation acts, it would be so held in this case by the courts because the employment greatly increased the normal hazard to which the average individual is exposed. This is true of Peck's frostbitten toe."



# State Is to Officially Rate Tractors

Eyes of the Automotive World Turned to Nebraska—First State to Require Manufacturers to Maintain Branch Houses and Official Testing of All Tractors Before Any of Them Are Offered for Sale—State University to Run Tests

By H. T. Dobbins

The eyes of that portion of the agricultural engineering world that has to do especially with tractors are turned on Nebraska, where the first experiments in state supervision of these motive power adjuncts to farming are being conducted.

Thousands of tractors have been purchased in Nebraska by the farmers. Because of disastrous experiences with some of the early models, the farmers demanded and obtained from the last Nebraska legislature, two laws. One requires the manufacturers of tractors sold in the state to maintain branch houses at convenient points in the state where repairs may be promptly secured. The other requires the official testing of all tractors before any of the models are offered for sale in the state.

This work is being done under the supervision of the agricultural engineering department of the University of Nebraska, with the state railway commission as the official body that

kind, and is said to be the only one of its kind in the United States. It is an intelligent effort to officially rate tractors, and for that reason has attracted the interest and attention of all manufacturers, who are eagerly awaiting the results. The work is done under conditions that as nearly as possible reproduce actual field conditions.

C. K. Shedd, in charge of the work, has received applications from 42 companies asking for a test of a total of 86 models. The result of these tests become official documents open to the public, and where dissatisfaction follows the first test, others may be secured.

Professors L. W. Chase, E. E. Brackett and O. W. Sjogren compose the board of tractor testers, and

is to issue permits to the companies whose stock models have fulfilled all requirements. Pending the results of these tests, temporary permits to sell are granted upon application.

This testing law is the first of its

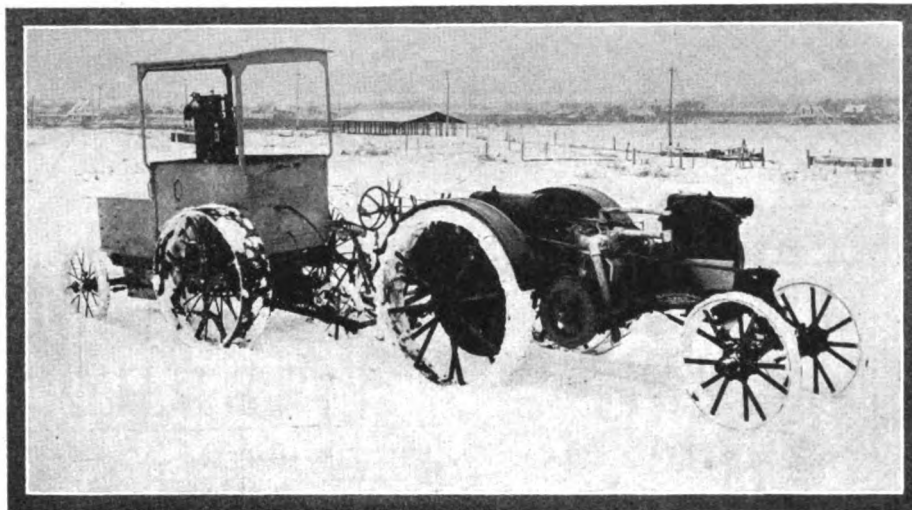


Fig. 1.—Dynamometer Car Used for Draw-Bar Tests.

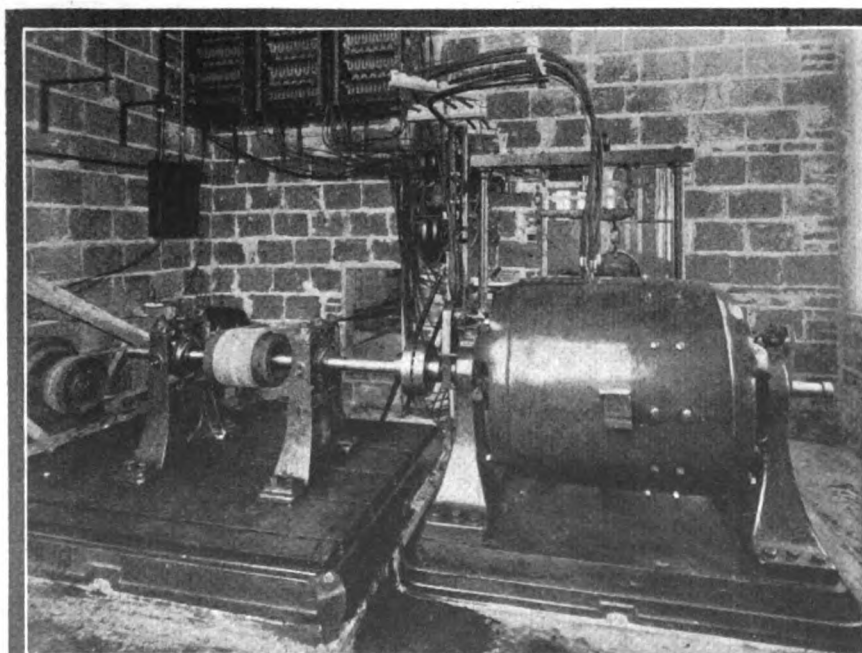


Fig. 2.—Dynamometer Used for Obtaining Belt Horsepower.

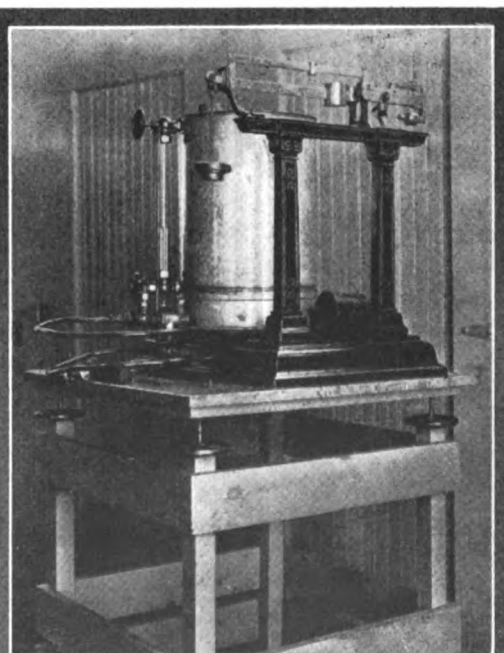


Fig. 3.—Fuel Weighing Device.



they have outlined the following as the complete tests for the work, which will interest all manufacturers:

1. Draw-bar work at from one-third load to full load for 12 hours. This gives the tractor an opportunity to limber up.

2. Brake horsepower test at rated load and rated speed for two hours. This test will show whether or not the tractor will carry its rated load on the belt, and also the fuel consumption at rated load.

3. Brake horsepower test at load varying from maximum to no load with all engine adjustments as in test 2, for one hour. This will show fuel consumption and speed control on varying load.

4. Brake horsepower test at maximum load for one hour with governor set as in test 2, and carburetor adjusted to give maximum power. This is to show the maximum horsepower of the tractor on belt.

5. Brake horsepower test at one-half load for one hour with governor set as in test 2, and carburetor adjusted for most economical operation at one-half load. This is to show fuel consumption at half load.

6. Draw-bar horsepower test at rated load for ten hours. This will be made on a half-mile cinder track and will show whether or not the tractor will carry its rated draw-bar load continuously; also show fuel consumption on draw-bar work.

7. Maximum draw-bar horsepower test. This will be a series of 50-foot runs with an increase of load for each run until the engine is overloaded or the drive wheels slip excessively.

8. Miscellaneous. This may include investigation of work on inclines, turning radius, effectiveness of brakes, or any other feature of the tractor which may seem to require special observation.

9. Tractors will be under observation for endurance throughout the complete test as outlined.

All of the tests are to be made at the university farm at Lincoln, and university employes will operate the tractors in all but the limbering-up run. Record of fuel consumption will be kept in both belt and draw-bar tests.

The brake tests will be made with a Sprague electric dynamometer of 150 H.P. capacity to which the tractor under test will be belted. A half-

mile cinder track is being constructed for draw-bar tests. It is hoped that these tests can be maintained in nearly uniform conditions so as to be fair to all tractors which will be entered for official rating.

In the draw-bar tests the tractors will pull a dynamometer car or loading machine, as shown in Fig. 1, consisting of a three-speed Illinois tractor chassis with an electric generator mounted in place of the engine and driven by power from the traction wheel of this chassis. The load can be adjusted by controlling the current in the generator.

This loading machine will be pulled through a Gulley traction dynamometer which will make a record of the draw-bar pull, the distance and the time.

This dynamometer, as shown in Fig. 2, is an electrical generator which registers the belt-wheel horsepower. The generator can be so adjusted as to offer any horsepower resistance desired.

While the belt test is being made, the tractor fuel tank is disconnected and connection made with a special fuel-weighing tank, as shown in Fig. 3.

With this device the weight of the fuel before and after the test can be made, as well as at any time during the test. This enables, in a large measure, the elimination of the personal factor in adjusting the carburetor.

The screws at the corners of the table are for leveling purposes. The table is in sections so the tank can be set to the height of the tank on the tractor.

### Will the Future See Concrete Automobiles? You Can't Tell.

We already have concrete ships, and now come concrete railway trucks. These trucks carrying a load of 55 tons, 10 per cent overload, have just passed the most severe tests.

The great advantages of concrete trucks are that the maintenance costs are practically eliminated and that they last much longer than wooden trucks.

It is said that extensive plans are under way for their production. It is hardly probable that concrete will be used for the bodies of pleasure cars, but it is possible that we will see the advent of the concrete motor bus in the near future.

### The Swan Song of Ye Olde, Busy Hitch Barns.

There is nothing perhaps that tells the story of the new order of things more strikingly than the disappearance of the "hitch barn."

Since the Corn Belt was settled, one or more "hitch barns" or "feed stables" have been busy business places in every town in Iowa, Nebraska and the rest of the Mid-West agricultural areas.

Here the farmers, when they came to town to trade, if they were to stay any length of time, left their teams, paying 25 cents if the team was fed, ten cents if just hitched.

Already some thousands of these hitch barns have gone out of business. Indeed, they are almost a curiosity nowadays. Corn-Belt farmers don't



The Old and the New.

jog to town behind Dobbin and Nellie any more, but come to town in their touring car or motor truck.

The photograph shows a couple of signs still swinging across the main street at Strawberry Point, Iowa, which attract the attention of tourists as they pass through the town. But it is not to a "hitch barn" that the Strawberry Point farmer drives his "wagon" when he comes to trade these days—he goes to a good-looking brick garage underneath the ancient signs.

# Readers' Questions and Answers

Conducted by E. C. Pohlmann

### Buick Data.

1. What are the gear ratios of the latest model Buick-Six?

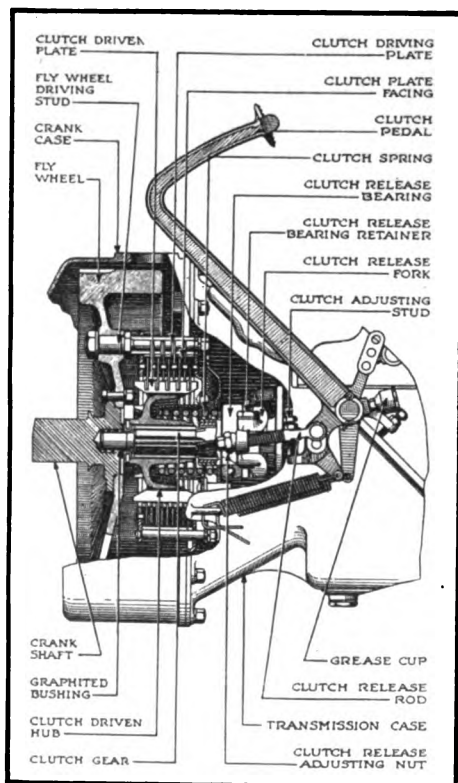
Please explain the construction of the clutch on the Buick-Six and how adjustments are made.—R. Z., Ind.

1. Models H-44, H-45, H-46, H47 have the following gear ratios: First, 13.75 to 1; second, 7.25 to 1; third, 4.1 to 1; reverse, 17.75 to 1.

Models H-49 and H-50: First, 15.5 to 1; second, 8 to 1; third, 4.6 to 1; reverse, 20 to 1. These gear ratios are approximate.

2. The clutch on the Buick-Six consists of a series of steel plates operating between steel plates faced with asbestos friction material, which are connected alternately to the flywheel or to the clutch shaft of the transmission as shown in the illustration. This is the ordinary dry plate disk clutch.

When the clutch is engaged, a spring forces the plates together, so that they revolve as a unit with the flywheel of the motor. Depressing the pedal separates the plates and prevents the transmission of power from the engine to the wheels.



### Buick-Six Clutch.

When the facing on the clutch wears, adjustment can be made by moving locknut and adjusting nut on clutch release rod to allow more clearance between the clutch release bearing and the plates. When

*Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.*

*Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.*

properly adjusted, there should be 1/32-inch clearance between the ball thrust and the rear plate against which it operates.

The position of the clutch pedal can be adjusted by means of the set screw in the rear end of the clutch release rod.

The clutch is lubricated by two grease cups, one located on the clutch-release yoke pin and one on the clutch-release bearing retainer, both of which should receive attention at least every 500 miles.

A few drops of oil applied to the pins on which the disks slide will prevent squeaking. Do not put any oil or grease on the clutch disks.

## Specializing on Battery Work.

I wish to specialize on battery work. Will you please tell me the best way to learn the work?—R. L. S., Wisc.

It is very hard for us, from the information you have furnished, to give you a definite procedure on the best way to learn the battery business.

If you have never worked in a garage or repair shop, and are not familiar with the operation and repair of automobiles, we suggest that if circumstances permit you take up a course at an automobile school specializing on battery work. Courses of a few months are usually given by these schools. Of course, if you intend to specialize on battery work and expect an extensive repair trade, it will be necessary for you to take a longer and more thorough course.

If you are a mechanic, have worked around automobiles, and have a general knowledge of the operation and care of batteries, we are of the opinion that you can start a charging station, and do repairs after spending a few weeks studying batteries, their care, operation and repair from some good book on that subject.

A very good book on the subject is "Storage Batteries Simplified," published by the Norman W. Henley Publishing Co.,

New York. This book explains the various makes of batteries and how to make repairs to them. It also gives a complete list of the necessary tools and how to use them; methods of charging and the application of a battery to an automobile, truck, motor boat, etc.

We cannot say that you will make a success of the business if you follow the latter method, and therefore suggest, if possible, that you take a course in battery work at some school, or else serve an apprenticeship at some battery service station.

To be successful in any business, it is necessary that you have a good fundamental knowledge of the subject. Unless you are very adaptable and practical, we are of the opinion that you cannot obtain this training from a study of this subject from various books, unless supplemented by actual practical experience.

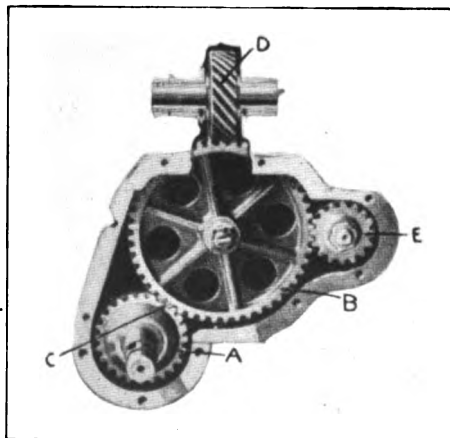
## Timing Gears on Studebaker.

1. Give the gear ratios of the Studebaker Six, Model "E. C."

2. Explain the timing and what precautions should be taken when taking down or assembling these gears.—H. F., Ga.

1. The gear ratios are: First or low speed, 13.5 to 1; intermediate or second speed, 7.4 to 1, high or third speed, 3.7 to 1; reverse speed is 17.7 to 1.

2. The timing gears on the Studebaker motors are distinctive and different from those of the majority of cars. These consist of three spiral gears running in a housing on the front of the crank case of the motor, as shown in the illustration. The



### Timing Gears on Studebaker.

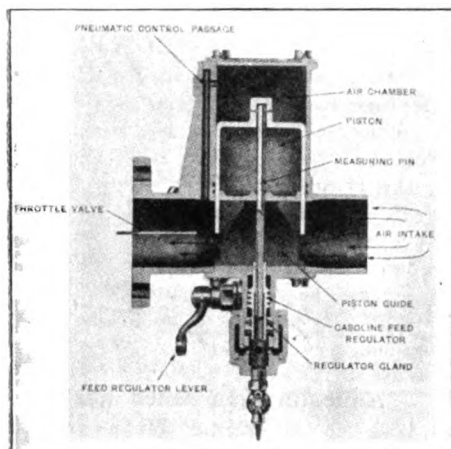
pump and crank-shaft gears are proportioned to drive the pump and distributor one and one-half times the speed of the crankshaft.

These gears run in an oil tight case and



are lubricated by a constant stream of oil flowing over them. They require no attention except constant lubrication.

If it is necessary to remove the timing gears for any cause, the only caution neces-



**Cross Section of Super-Six Carburetor.**

sary to replace them perfectly is to see that the crank-shaft gear, *A*, and the cam-shaft gear, *B*, are put on with the marked tooth on *A*, exactly between the two marked teeth on *B*, as shown at *C*.

The distributor and pump-shaft gear, *D*, can be placed in position above the cam-shaft gear. The arrangement of the timing—so far as the gears are concerned—is thus completed, and timing of the spark can be regulated through the distributor coupling.

\* \* \*

### Welding Gears.

I would like to know whether a broken transmission gear can be welded satisfactorily; that is, welded so that it will be true and as strong as new? Please tell me, also, whether it is good practice to weld stock on stripped teeth.—C. E., Ill.

The question is not specific enough, since there are several kinds and sizes of transmission gears now in use for the different makes of cars and trucks. The location of the break or damage also makes a difference as to whether or not it can be satisfactorily welded. It is almost impossible to do a good job of welding on some of them, while others are comparatively easy. Most of this depends upon the location and the extent of the fracture.

The welder must be very careful to keep his torch flame strictly neutral all the time when welding transmission gears of any kind.

He must also use a filler rod adapted to the job, usually a nickel-steel rod. This must be deftly applied to the crack which should first be grooved as is customary with most welding jobs. The bottom of this groove and the sides of it must be melted fluid enough to receive the filler metal before this is added.

The filler metal should be fed into the weld and never allowed to drip into it. Keep the flame in motion, and do not hold it too close to the weld. If the hot, live

sparks begin to fly, the metal is probably commencing to burn, which should not be permitted; draw the flame back from the weld, use a smaller tip, or change the motion of the flame.

Before attempting to weld the gear, it should be removed from the shaft and the broken parts properly aligned. This aligning may be done by spot welding or some sort of levelling or clamping device. It is a good idea to preheat the whole job to a dull red before and during the welding process.

Yes, it is considered good practice to weld stock on stripped teeth of all kinds of gears. The process is quite simple. However, the welder should take the trouble to see that the cause of the stripping is removed or, at least, acknowledged because the gear is liable to be stripped again as soon as it is put into service, and then the welder will get the blame for it, although his weld may be a good one.

Choose a filler of the same metal as that of the gear and apply it as rapidly as possible in layers along the tooth. Pile one layer on top of the other, drawing them in at the top to conform to the shape of the unbroken teeth. Add enough surplus metal on the sides and top of the tooth to allow stock for filing or machining the tooth to correct size and shape. Use a good flux if it is needed, and be careful about choosing the correct tip for the weight of the gear. A torch tip too large will do as much damage as one too small.

If the teeth are small, it is better to weld several or all of them in one mass, then mill or file them out one at a time. The ends and sides of the teeth may be given a better appearance by a clever manipulation of the flame. The pressure of the flame is used to smooth the ends and sides by shooting it down along them in a way to sweep the melting metal from the weld.

Be sure that the bottom layer of the weld is thoroughly knit to the gear and be sure that the next layer is melted into the first. These precautions with the metal added in an unburned state should produce teeth that will wear as well as the original teeth.

If you will be a little more explicit with your questions, we can no doubt help you more in regard to details in the welding operations.

\* \* \*

### Hudson Super-Six Carburetor.

Will you please explain the operation of the Hudson Super-Six carburetor, and how to make adjustments?—S. B., Me.

The Super-Six carburetor is a special type adapted only to the Super-Six engine. This special type carburetor may be said to be pneumatically controlled since no action of the driver can alter the proportioning of gasoline and air.

The mixing chamber of the carburetor wherein the gasoline and air are proportioned and vaporized, is of such design as

to control itself by the amount of mixture passing through the throttle valve.

In this way it will be seen that, upon opening the throttle suddenly at low motor speeds, the requirements of the motor are comparatively small and the suction is comparatively weak.

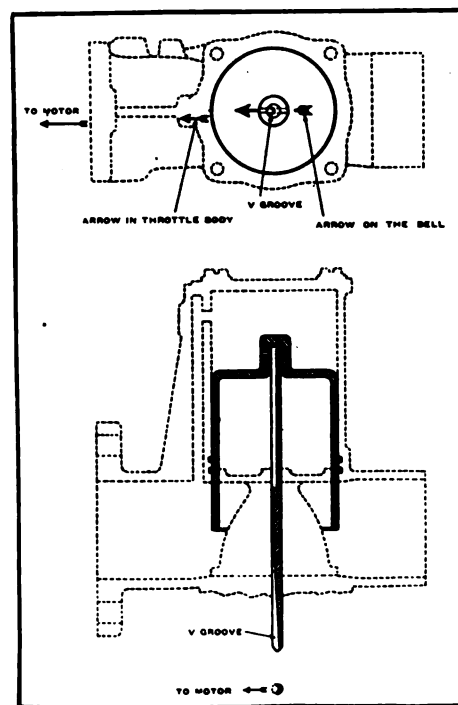
This suction of the engine controls the mixing of the gasoline and air pneumatically by lifting a piston measuring device in the mixing chamber (see illustration), thus allowing only the correct amount of mixture to pass through. The necessary velocity or vacuum at the mixing device is controlled by the piston and gives perfect vaporization without having to use an excess of gasoline to obtain that result.

Aside from the periodical cleaning out of the screen at the base of the float chamber and draining off any water or sediment which may have accumulated below the regulator, there is absolutely no maintenance or intricate adjustment necessary.

To adjust the engine for idling, manipulate the set screw in the butterfly lever, until the desired speed is obtained.

The gasoline measured out by the measuring pin may be varied by the gasoline feed regulator which is connected to the lever on the dash. In cold weather it is to be expected that a little richer mixture will be required. In warm weather it may be set to a leaner mixture.

The only attention necessary will be to see that the filter under the float chamber is not clogged up and that the needle valve is seating properly and does not al-



**Method of Assembling Metering Pin.**

low the gasoline level to increase and flow at the regulating sleeve.

If the piston valve sticks in the cylinder it is only necessary to remove the cover at the top of the cylinder, withdraw the



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Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

When a piece of steel is annealed, the crystalline structure is changed and also the internal strains are reduced.

The commercial method of annealing steel consists of packing the piece in a cast-iron box containing some material such as powdered charcoal, charred bone, charred leather, slaked lime, sand, or fire clay. The box is then heated to the proper temperature and then the box and contents are allowed to cool at a rate slow enough to prevent any hardening. The temperature for low-carbon steel should be 1650° Fahrenheit and for high-carbon steel 1400-1500° Fahrenheit and should be maintained long enough to heat the entire piece evenly throughout.

If only a small piece of steel or single tool is to be annealed, it can be done by building up a fire brick box in the forge, placing the piece in it, covering top, and then heating the whole to the required temperature. Cover with coke and allow it to cool over night.

To anneal cast iron, heat it in a slow charcoal fire to a dull red heat; then cover it over about two inches with fine charcoal, and finally cover well with ashes. Let it lay until cold. Hard cast iron can be softened enough in this way to be filed or drilled.

The trouble you have experienced in annealing steel has been the result of not entirely covering the piece so as to exclude all air. If air gets in contact with the steel while hot, it decarbonizes it, which makes it brittle.

That is the reason why the steel should be well covered to exclude all air, and charcoal should be used if handy, because it supplies all the carbon necessary

Quick annealing can also be partially effected by what is known as water annealing. Steel is slowly heated to a cherry red and then removed from the furnace and allowed to cool until it ceases to char a piece of wood. It is then quickly plunged into soapy water.

This method, however, is not strongly recommended, because it is said to have a deteriorating influence upon the steel, and should be resorted to only in an emergency.

\* \* \*

### Cadillac Differential Adjustments.

1. How do you test lubricating oil for acid?
2. What is the firing order of the Cadillac-8, Model 53?
3. Give the adjustments of the bevel pinion and driving gear on the model.—R. J., Mich.

1. Lubricating oil can be tested for acidity with litmus paper. Get some blue litmus paper from the druggist, take one strip and soak it in a small quantity of oil mixed with warm water or alcohol. If the blue turns distinctly red it contains free acid.

2. The firing order is as follows: L-1, R-2, L-3, R-1, L-4, R-3, L-2, R-4.

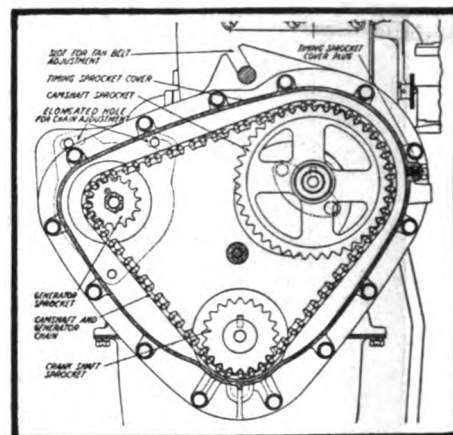
3. If there is play in the pinion shaft, marked *H* in the accompanying drawing, adjust the bearing, *O*, as follows:

Remove pin *P*, loosen bolt *X*, and lift the key, *N*. Do not destroy the rubber filler attached to it. Turn the adjusting nut, *J*, as far as possible without making the bearings too tight. Replace the key in one of the slots in the adjusting nut, replace the pin and tighten bolt *X*.

If side play is found in the gear mount, *E*, remove the key, *A*, loosen the cap

and lift key *N*, out of slot and turn nut *K*, to right to mesh pinion deeper, or to the left to bring it out.

Turning the adjusting nut, *K*, moves the pinion, *G*, and its bearings, *O* and *R*, as a



Adjustment of Timing Chains.

unit, without altering the individual bearing adjustments.

If it is found necessary to move the large bevel gear sidewise, loosen bolts holding caps *L* and *M*. Remove keys, *A* and *B*, out of slots and turning adjustment nuts *C* and *D*, right and left alternately to move gear to the right, and left and right alternately to move gear to the left. Do not forget to replace keys in slots and tighten bolts holding the caps.

\* \* \*

### Oil Rust Preventive.

Should kerosene be used as a rust preventive on brake-rod pins?—C. P., Ind.

We would suggest that you use a half-and-half mixture of kerosene and engine oil as a lubricant and rust preventive on small, exposed parts such as brake-rod pins. The kerosene will loosen the rust, and on evaporating will leave the engine oil as a lubricant.

\* \* \*

### Chain Adjustment.

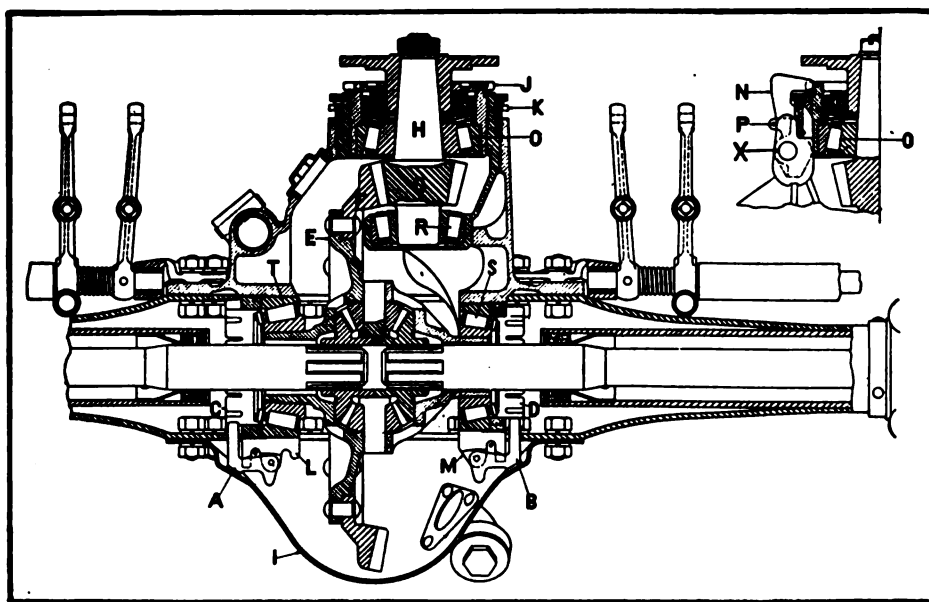
What causes the timing chains to hum? Please explain how the timing chains on the Hupmobile can be adjusted to eliminate this noise.—M. C., Md.

Humming or grinding of the timing chains is caused at high motor speeds when they are set too tight.

The timing chain on the Hupmobile is equipped with a very simple adjustment which makes it possible to keep it at the proper tension at all times. This adjustment is controlled by the position of the generator.

The generator is secured to the front plate by three bolts, the lower of which is fixed and the two upper slotted, as shown in the illustration, allowing for 5/16-inch movement of the generator sprocket.

If the chain is set too tight, unfasten the generator and move it nearer the crankcase until the proper tension is obtained.



Cadillac Differential Showing Adjustments.

to combine with the oxygen and there is less possibility of decarbonization.

Another quick method is to heat the steel to a red heat, bury it in dry sand, lime or hot ashes, and allow it to cool.

screws holding cap *L*, and turn the adjusting nut, *C*, as far as possible without making the bearings too tight.

If it is necessary to move the pinion, *G*, endwise, remove pin *P*, loosen bolt *X*,



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Investigate the many exclusive features of CURTIS Garage Air Compressors. The line is complete—five sizes—stationary or portable. Just write your name and address on the margin of this advertisement—tear it out and send it to your jobber, or to us direct, for complete information and prices.

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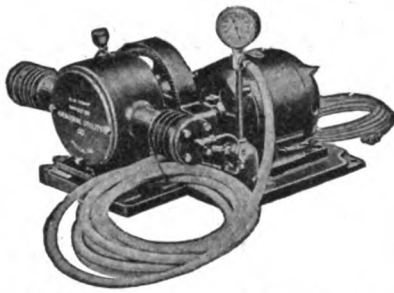
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A battery for every car  
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# BATTERIES



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The standard GENERAL Compressor, mounted on bed plate with  $\frac{1}{2}$ -horse, ball bearing, G-E motor (A. C. or D. C. 110 V. or 220 V.). Delivered ready for service.

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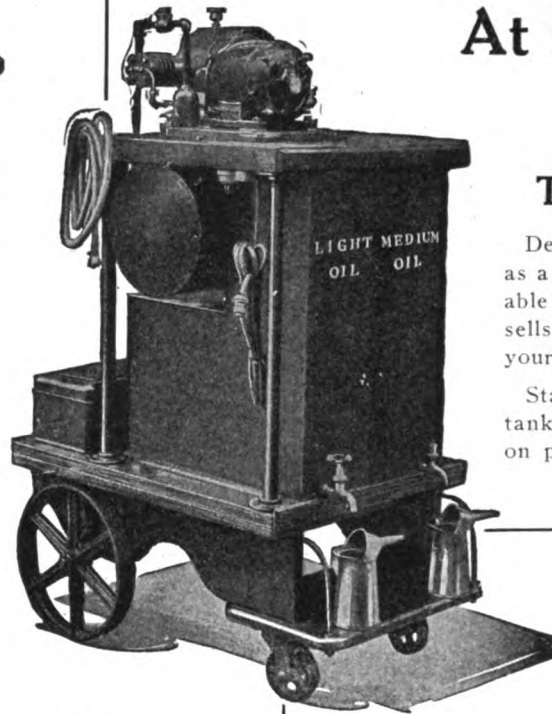
**Exhibited at the  
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**T**HE superior efficiency of General Air Compressors is directly due to their horizontal opposed 2-cylinder construction. They deliver two-cylinder efficiency at one-cylinder cost. They will inflate an average sized tire in two minutes.

Their construction insures the greatest reliability and low maintenance cost. They are built in our own factory which is equipped with the most modern machinery and has proved itself capable of turning out compressors of a uniformly high quality that gives place to the product of no plant in America.

General Air Compressors are furnished with outfits to meet all garage and service station needs. Write for descriptive literature and name of nearest distributor.

*We want to get in touch with distributors to cover some desirable territory still open.*



## Clean, Cool Air At Low Cost

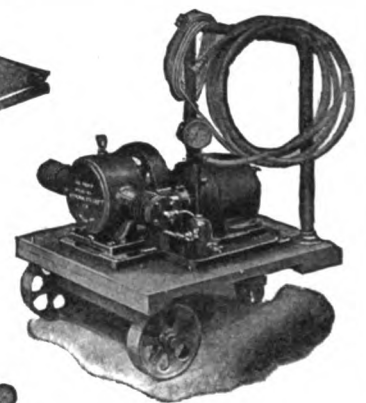
### The Utility Model

Designed to use Free Air service as a direct money earner. A portable air outfit and oil service. It sells oil to the motorist who uses your air service.

Standard Compressor with air tank, two oil tanks, and tool box, on portable stand.

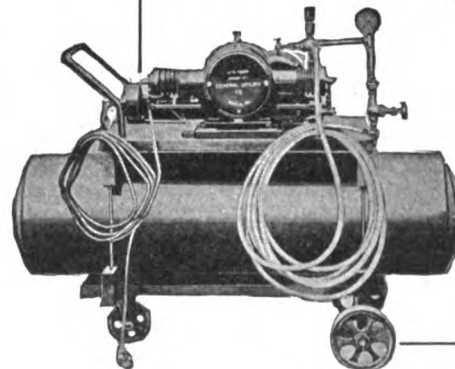
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—With ball bearing equipped truck and complete equipment ready for service.



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*Two Cylinder*  
**GENERAL**  
AIR COMPRESSORS

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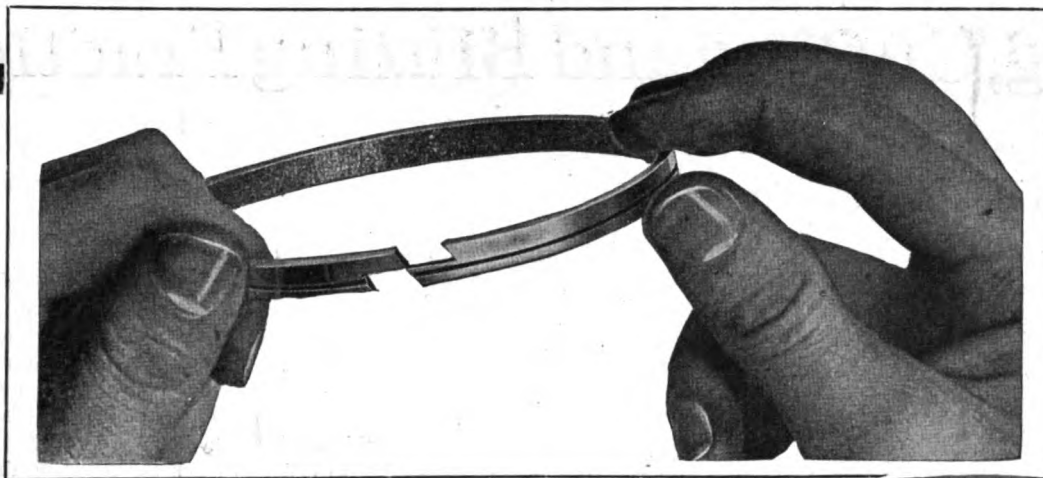
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## Trench vs. Open Warfare Against Friction

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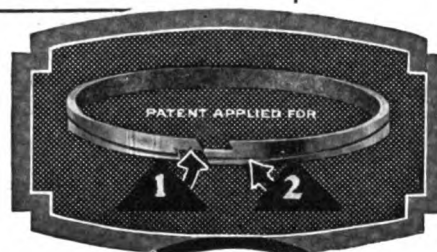
This remarkable improvement in piston ring design, reaching and lubricating heretofore untouched high points on the cylinder wall, as well as the ring itself, protects and greatly prolongs the life and efficiency of the ring.

Oil, controlled by the scraping edge of this groove and returned to the crank case, represents more than an economy; it eliminates the formation of just so much carbon.

### GENERAL LIGHTNING CUT PISTON RINGS

are individually cast; concentric in shape and of one piece construction. There are reasons why for all three manufacturing decisions. The results obtained are invariably more power, more mileage, less fuel, less oil, less friction and less wear.

*Write for further details and sales proposition.*



1. The Lightning Cut.
2. Oil Distributing Groove.
3. RIGHT: Shows shape of oil groove. Note Scraping edge.

BOTTOM: Shows upward course of oil groove.



# CORPORATION

Representatives

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New Stock Exchange Bldg., Philadelphia

Two Cylinder  
**GENERAL**  
AIR COMPRESSORS

*Because They Serve*

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# Welding, Cutting and Brazing Practice

Welding the Interior Fracture of an Automobile Engine Cylinder—Casting Cracked in the Inner Wall of the Water Jacket of Both Cylinders—Cracks Could Not Be Reached from the Outside—Method of Doing This Kind of a Job

By David Baxter

Recently I was fortunate in witnessing the welding of a difficult automobile cylinder job, and was also able to obtain some pictures of the casting and the devices employed in doing this clever piece of repair work. These photographs, together with a detailed description of how the weld was made, will no doubt furnish much beneficial information to the garage welder; particularly, since we are in the midst of winter, the time of cracked automobile-engine cylinders.

Such a job may come into the garage at any time, so it may be well to have a fairly clear idea of what to do, and how to do it in order to make the repair in a hurry—automobile repair jobs are nearly always wanted in a hurry.

The casting referred to was cracked in the inner wall of the water jacket of both cylinders. The cracks were about three inches long and located on the shoulders between the two cylinders. The cracks were not apparent on the outside of the casting, neither could they be reached from the outside except through a small hole in the upper end of the casting.

This opening was too small to permit the welding flame to be operated through it and, even if the welding flame could be operated through it, only a short part of the cracks could have been welded—that part directly under the hole. The ends of the fracture would still leak.

It was next to impossible to do the welding through the bore of the cylinder, on account of insufficient room and inability to reach the cracks with the welding flame. There was, therefore, but one thing to do—cut out a section of the outer wall big enough to permit a free manipulation of the torch and filler rod. This was done as shown in Fig. 1.

The cylinder casting had a metal thickness of about  $\frac{3}{16}$ ths of an inch. Considerable skill was required in the manipulation of the torch and filler rod, more so than would be required on heavier metal, because there is danger of melting holes in the inner wall or burning the filler metal, thus making a porous weld. The former happens if a flame too large is employed; the latter, if the flame is too small; both, if the flame is not handled deftly.

There is also considerable danger of expansion and contraction cracks when welding cast-iron jobs of thin sections, such as this cylinder casting; more danger than if the jacket walls were twice as thick. The thin sections of metal com-

bined with the irregular or complex shape of the casting make it necessary to use special care when heating and welding cylinder jobs like this one.

If the casting is not properly heated previous to welding, and the heat is not maintained during the process, parts of it will heat ahead of others, resulting in cracks due to the unequal expansion. Then, too, if the job is not permitted, or perhaps I should say caused, to cool slowly and evenly after the weld is finished, it will crack either in the weld or near it, due to unequal or uneven contraction. The metal is so thin that there is not sufficient metal to absorb the heat reactions.

By this I mean that heavy castings take up part of the strain within themselves,

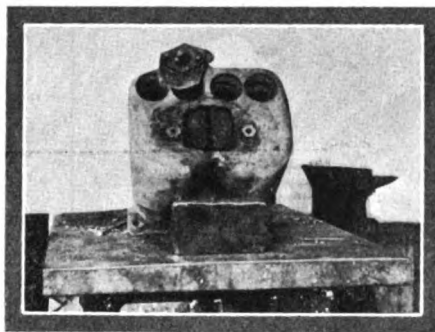


Fig. 1.—Section of Wall Removed.

so to speak, and no open cracks appear on the surface. The strain, however, may manifest itself in the form of an open fracture later on when the casting is in service. With a casting like this cylinder it is almost certain to appear immediately if the contraction is not well balanced.

Not only must the job be heated and cooled correctly but the filler metal must be melted and fused just about right. In a way, this is not a particular part of the welding, since no part of the cylinder weld has to be machined. The added metal need not be absolutely free from hard spots because it does not have to be filed or drilled.

The welder should avoid a spotted weld as much as possible, since the hard spots tend to cause cracks. That is, the hard metal is more brittle, has more contraction which acts more rapidly, and is, therefore, more liable to fracture when cooling. But at that, it is easier to make a weld that needs no machining because the torch operator may turn most of his attention to regulating the expansion and contraction. He may pay more attention to the actual fusion if he is not so fearful of

producing a weld too hard to machine.

As it would require more than the allotted space to go into details concerning the many things the torch operator should do or should guard against when welding cast iron, let us proceed with the work on this particular cylinder job.

In order to reach the cracks in the inner wall a section of the outer wall was removed as is illustrated in Fig. 1. This was done by drilling numerous small holes around the section in a sort of circle directly over the cracks. These holes were drilled entirely through the outer wall, as close together as possible; each hole nearly touched the other.

The piece was then cut or broken apart with a thin sharp chisel. After which the part surrounded by the holes was removed from the casting by prying it out with the blade of a chisel. Then the cut-out section was taken to an emery wheel, where the drilled edge was beveled. This beveling extended back from the bottom of the rough edge to the outer surface in a gradual slant. In other words, the broken edge was ground, wedge-shape.

Then the entire edge of the opening, formed by the section being removed, was beveled with a sharp chisel and a light hammer. In other words, the edge of the opening was cut wedge-shape.

When the cut-out section was replaced for welding, the beveled edges formed a wide groove, reaching the full metal thickness. Before replacing this section, however, it was necessary to weld the cracks in the inner wall. To do this, the casting was first arranged for preheating.

The cylinder was placed in an oven-like structure of fire bricks, the broken side upward and the bore resting upon some pieces of brick. These pieces raised the job enough above the level of the table top to permit a special gas burner to be inserted beneath the casting. This burner was used to heat the job previous to welding. The position of the cylinder and the gas burner in a partially completed brick oven is shown in Fig. 2. Before lighting the gas burner, the casting was entirely surrounded by the brick wall. The bricks were laid loosely without mortar, and a cover of asbestos paper was spread over the top of the oven before lighting the preheater.

The bore of each cylinder was packed full of asbestos paper scrap before placing the casting in the oven. This was for the purpose of preventing the gas flame from coming in direct contact with the



# ALSOP-ALL-SPARK

## This Test Proves

Address Reply to Duplicate to  
DIRECTOR OF MILITARY AERONAUTICS  
Washington, D. C.

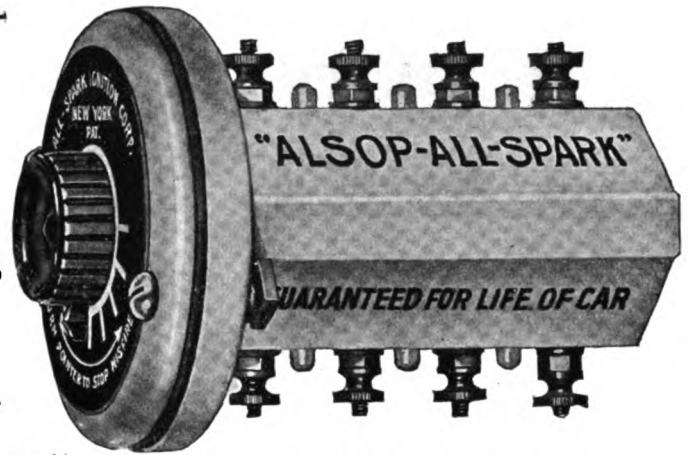
U. S. ARMY DEPARTMENT  
OFFICE OF THE DIRECTOR OF MILITARY AERONAUTICS  
WASHINGTON

January 19, 1919

From: Engineering Officer, Camp Morrison, Va.  
To: Commanding Officer, Air Service Depot.  
Subject: Supplemental Report on Test of Alsop Ignition Device.

1. In order to ascertain whether the device would insure ignition through plugs that were carbonized, cracked or rendered inoperative from other causes, one quart of oil above high level was placed in unit #9, the car was run until the motor died and could not be again started. The spark-plugs were then inspected and found to be heavily carbonized.
2. The Alsop Device was then attached, and within a short time all plugs were firing perfectly. The plugs were immediately removed and found to be clean - free from oil and carbon.
3. Then the Alsop was removed entirely from the car, motor was started again and ran for about four hours, then due to the excess oil still in crank-case, the plugs again became fouled and motor stopped. The heavily carbonized plugs were examined and replaced without cleaning.
4. The following day, Jan. 20th, the Alsop device was reinstalled with same results as before.
5. Later, a mixture of 50% kerosene and 50% gasoline was placed in the tank, no changes were made in the motor, carburettor or ignition device. The engine started as easily as with straight gasoline, developed greater power and continued to operate as above. No carbon formations were found on the plugs after using up the tank full of the above mixture.

*Wm. A. Taylor*  
Capt. U.S.A.



That our claims are *too* conservative. What the War Department found to be true about the "Alsop-All-Spark" is proven every day—wherever this wonderful little device is installed owners enthuse over it. They find it will cause old, cracked, carbonized and oil-soaked plugs give to powerful sparks. It eliminates carbon, saves gas, develops greater power and insures continued driving without misfires.

## DEALERS—HERE'S YOUR CHANCE

There's a constant and growing demand for such a device—one that is absolutely guaranteed—one that has no dangerous exposed spark gaps, which may set a car afire, one that does not make a car hard to start or cause uneven timing.

**Send \$7.50 for 4-cylinder device with money back guarantee. Dealer discounts and our catalogue of Convincing Government Tests upon request.**

## DEALERS—AGENTS—SALESMEN—WANTED

# ALL-SPARK IGNITION CO., Inc.

13-D Water Street

New York

polished surface of the cylinder bore, which often results in a blistered or distorted bore.

When the job was ready in the preheating oven, the gas burner was lighted, slowly

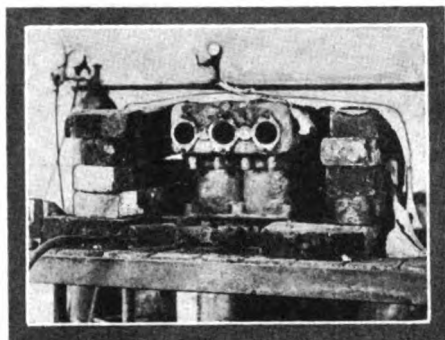


Fig. 2.—Preheating Arrangement.

at first, increasing the pressure until the whole casting became red hot all over. This required probably an hour and was ascertained by peeping beneath the asbestos covering from time to time.

The operator kept a constant watch over the job to see that it did not overheat, both during the preheating and during the welding. If the casting had been allowed to get white hot, it would probably have blistered or distorted. When any part of the job showed signs of getting too hot, the gas burner was shifted a little or the pressure was cut down, the idea being to cause the preheating flames to envelope the casting evenly throughout.

When the job was red all over, a small portion of the asbestos covering directly over the cracks was torn away. Only enough was removed to permit welding room. Then the welding torch was lighted and regulated to a neutral flame. This was accomplished by opening the acetylene cocks before applying the tip to the lighters.

Some welders make the mistake of applying the tip to the lighter before turning on the acetylene, but this is hard on the torch on account of the sudden shock of the igniting gas. Another thing makes this a bad practice: The carbon of the acetylene gas is liable to be injected into the weld if the welding flame is lighted or re-lighted on the melting weld. This is the usual method of so many operators.

As soon as the flame was burning with the white neutral cone, it was applied to one end of a crack. A small revolving motion was given the flame over the end of the crack until the iron started to melt. Then a filler rod of soft cast iron was brought into contact with the weld. Both the casting and the filler metal were then melted together under the moving flame.

The filler rod was also given a certain amount of motion by twisting and sawing in the weld. As fast as one portion of the crack was worked together, the torch was moved onward to a new portion of the crack, treating this in a like manner.

Because the cracks were located on a

corner, no attempt was made to groove them. Therefore, it was necessary to melt and churn the crack into one mass, which was easy to do since the surface appearance of the weld was of secondary consideration. Little of the filler metal was used to weld the inner cracks on this account, although a slight surplus was piled along each crack.

When the first crack had been welded from end to end, the flame was immediately swung to the other crack where it was manipulated in a manner identical with the first one. Both cracks were welded rapidly to prevent melting a larger area than was needed to fuse the fracture.

After welding the second crack, the asbestos covering was replaced for a few minutes while the cut-out section was heated previous to inserting it in the casting. This piece was heated to prevent a difference between the temperature of the patch and that of the casting. When the piece was red, the asbestos was torn aside again and the cut-out part inserted.

Arrangements were made in advance to prevent the piece from falling through the opening. This was done by spot welding tiny projections at intervals along the beveled edge, which would engage the bevel of the opening in the casting.

This part of the repair was more particular since the gland opening in the center of the cut-out part must be pretty near correct when the weld is finished. But by exercising ordinary care the welder had no trouble on that score.

As has been stated, the weld was not particularly guarded save to prevent pinholes; or more properly speaking, gas holes were prevented from forming in the melting weld. These small orifices often cause a water jacket to leak after the casting is put back into service, although they do not appear on the surface of the weld of any consequences in the welding shop.

Probably the chief cause for the formation of the so-called pinholes is that a tiny particle of oxide is trapped in the melting metal where it turns to gas and endeavors to reach the surface of the molten weld. If it cannot escape freely, it will leave a pinhole where it exits. In other words, if the weld is melted fluid enough, the gas escapes and the hole closes behind it. A poorly melted weld is as bad or, perhaps, worse, than an overheated one since the sluggish metal congeals before the gas can escape; where it does escape, the molten metal is too sluggish to flow together again. This results in the tiny crater-like orifice called gas hole.

It was these treacherous defects that the operator guarded against mostly when welding the cut-out patch of this cylinder casting. He was careful to melt only as much of the casting as was needed to make a strong bend with the filler metal. The filler was added to the beveling groove of the weld only when ready to flow into

it, and only when the groove was ready to receive it. The filler metal was never allowed to drip into the weld, but was always fed to the weld by contact.

The distance of the point of the welding flame from the melting metal was gaged early in the process. After that the operator endeavored to keep it in motion this distance above the weld, never permitting it to rest more than a moment or so very close to the weld. These precautions, coupled with a liberal supply of cast-iron flux, prevented pinhole trouble.

The last weld was made through an aperture in the asbestos, the same as the crack weld. First, a part of the bottom of the groove was melted in until the groove closed at the bottom with metal from the sloping sides of the groove. Then the filler metal was melted in until the groove was filled, care being taken to see that the sides, as well as the bottom of the weld, were fused.

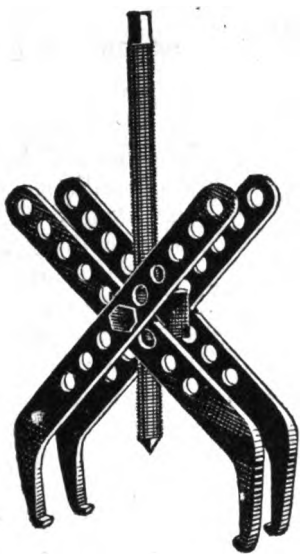
Half the distance around the patch was welded about an inch at a time, each inch being but a continuation of the preceding one. Then the flame was carried back to the original starting point and the weld was made around the other half of the opening. A slight surplus of filler metal was added along the weld, rounded over and smoothed down with a painting motion of the welding flame.

When the last inch of the weld was finished, the asbestos was placed over the opening. The preheater, which had been burning during the welding, was permitted to burn for five or ten minutes to even up the expansion before it was shut off to allow the cylinder to cool. The entire oven, covering and all, was allowed to remain intact for about an hour before uncovering, or until the casting would no longer hiss a moistened finger.



Fig. 3.—The Finished Weld.

Then the oven was torn down and the casting was ready for service after a small amount of cleaning and grinding. Fig. 3 shows the finished weld as the casting came out of the preheater.



## AN HONEST REPAIR MAN

"Little Giant" will do a full day's work every day—do it quickly and efficiently.

Removes gears, wheels or pulleys in less than half the time required by the ordinary tool for these purposes. Can be adjusted for inside and outside, and all sorts of angular pulls. No other puller has the long, strong and quickly adjustable arms to get into cramped and limited spaces where a pull has to be made.

This modern appliance pays its own way and produces a profit in the saving of time and labor.

## THE HARDER THE PULL THE TIGHTER THE GRIP

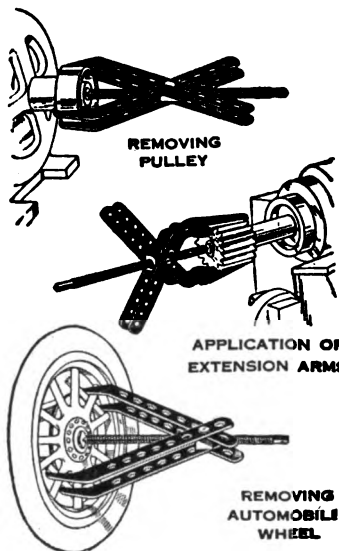
Cannot slip off work—the principle is correct—the result is maximum efficiency with minimum effort. See sketches showing application of "Little Giant" to various kinds of work. Easily adjustable up to 13 inches in diameter.

## A Profitable Necessity for Garages and Repair Shops

Garages and Repair Shops will find this Puller a valuable addition to their equipment. Pays for itself on first job and brings about a reduction in operating costs and an increase in the earning capacity of the repair department. Price, complete with extension arms....\$11.00

**DEALERS--Order from your jobber**  
—or direct, if he cannot supply you.  
**Your price is \$7.70**

**Premier Motor Products Company**  
3954 N. Robey St. CHICAGO, U. S. A.



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Premier Motor Products Company,  
3954 N. Robey St.,  
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Find enclosed \$7.70 or send EXPRESS C. O. D.  
FOR APPROVAL One (1) "LITTLE GIANT"  
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Name .....

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As advertised in Am. Garage & Auto Dealer.

**Accounting.***(Concluded from page 25.)*

[Editor's Note: Since it is the policy of the American Garage & Auto Dealer not to publish any prices, they have purposely been left out. Prices will be gladly furnished on request.]

\* \* \*

**Books on Garage Accounting.**

We are very much interested in proper accounting methods and would thank you very much for the name of any other person or work on automobile, garage and shop accounting.

We are particularly interested in some book which gives an outline of how the costs of material and labor in the shop should be handled.—W. M. Co., Okla.

I am sorry to state that I can offer no suggestions regarding practical reference works on garage accounting. There may have been published recently something good on the subject that the writer is not familiar with. Should any of our subscribers possess anything along this line I would be pleased to have the name of the book.

The best articles on garage accounting appear from time to time in the various automobile trade journals. The Chalmers Motor Co. issued a very good manual several years ago, but of course it did not attempt sufficient detail to satisfy the average garageman.

Garage shop accounting differs only from any other shop accounting in minor details, and the principles applying to general shop accounting apply equally to the garage. Although there are many excellent works on accounting, we fear the average garageman would derive little benefit from a study of them, as they lack the local application, without which it is hard to grasp.

The articles appearing in the American Garage & Auto Dealer will be published later in book form and will, I hope, offer some assistance to a field universally neglected by practical accountants.

I shall endeavor to help the American Garage & Auto Dealer to get a list of all publications on garage accounting and shop methods. In the near future we will devote at least one entire article on repair department accounting. In the meantime, we would be pleased to exchange ideas with you along these lines. We do not like to have the accounting department of this journal become a one-man department. Review your June issue

and see if you cannot help us, yourself, and fellow automobile dealers.

J. N. Boddy.

**Missouri Town Officials Plan Welcome to Tourists.**

A hospitable way of welcoming tourists has been planned by the city officials of Hannibal, Mo. Large signs are posted along the rural highways at the edge of the village announcing that tourists will be welcome.

As the motorists approach the business district, they are stopped by traffic policemen and presented with a complete and up-to-date road map, photographs of all points of interest, directions as to how to reach the marked trails, distance to nearby cities and other information.

**Motor and Accessory Mfrs. Ass'n. Sanction Boston Show for 1920.**

The eighteenth annual Boston Automobile Show for passenger cars, commercial vehicles, and accessories, has been sanctioned by the Motor & Accessory Mfrs. Ass'n.

**Removal of Snow from Highways Urged by Authorities.**

In an effort to keep all lines of supply open for uninterrupted traffic during the winter months, and to thus aid in minimizing the discomforts of the public, an appeal is going out to highway authorities throughout the country where the snowfall is heavy to keep the roads clear of snow.

Emphasis is placed upon the fact that the transportation of coal and other fuel is more important in winter than in summer, and that it is equally important to keep rural mail routes and main market roads free from snow as it is to keep railroad tracks clear.

Officials connected with highway work anticipate a prompt response to this appeal. They report a decided increase in the interest of the public on this matter of prompt removal of snow from highways, not only to meet the necessity of keeping all sources of supply and communication in effective operation, but as a means of protecting the public's investment in roads.

**Hold Farmer Responsible for Damages to Disabled Car.**

A recent case in the courts of Idaho involved a car on which a spindle had been broken. Leaving his car in the road, the owner had walked to the nearest town for assistance.

During his absence a farmer pass-

ing with a load of hay did not use sufficient care and ripped the rear fender and running board from the disabled car. In the decision rendered the defendant was held responsible for all damages.

**My Boss Is Got Sum Ideeahs.***(Concluded from page 18.)*

had em in an old paper box hede picked up and he droppt the box on the sidewalk just as the boss was cumming along. That diddent seme to mene ennything in Josey's life for he pickt up the box and give it a toss into the man's car.

While the man was paying for the stuf the boss says, "What's in the box?" and Josey told him. "Lets see thoze spark plugs," he says. So the boss opened em up and lookt at the spark plugs and sed to Josey, "Get him a cuppel of thoze 'red eyes.' Hele like em better."

Then after the dele was all closed up and the man gone, the boss took Josey into the back rume. It was a grate day for back rume talks. I thought Ide better see what was going on so I skipt into the stock rume agen and lissened and I herd the boss saying, "When you droppt that packig on the sidewalk you broke one of thoze spark plugs. That wood have bin a fine thing to let that man go with a new spark plug all reddy busted. Now lissen to me!

"Whenever you sel a man ennything, see it is put into his hands in perfect condishun, and dont handel automobeel parts like they was junk. Weve got the stuf here to pack up things rite. Taik enuf paper and ex-sellsior and string to maik a packig rite and then dont go throwing it around like you were shooting baskits in the Y. M. C. A. The way you had that stuf dun up, ennyboddy wood think string was a dollar a foot, and paper and packing, you diddent use enuf paper to maik a paper napkin for a nat. I kno we aint running a dry goods store and it aint cut glass were handling, but even automobeel parts can be broke on a bet."

Now that did me just as much good to here that as if Ide bin in there and the boss had bin telling it to me and I gess Josey and me will kno better than to brake enny more spark plugs on the sidewalk. I lern sumthing every day and sum days twise.

Your old collig chum,

BILL.



# Two Stage *Usaco* Air Compressors

*Mature investigation and deliberation will emphasize the wisdom of purchasing Two Stage De Luxe Air Compressors because, in them, is obtained:*

**High pressure Air in great volume, hence capacity to quickly handle a large number of pleasure car tires or giant truck tires of any size or pressure.**

**Pure air, without moisture or oil, for Usaco Compressors have both filtering trap and automatic air purifier, a new and valuable feature.**

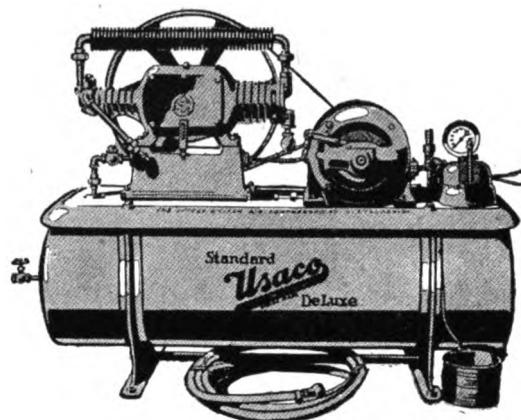
**Capacity sufficient to accomodate rapid growth of business and serve you faithfully, with minimum attention and freedom from repairs for years to come.**

**An outfit that is completely automatic and fool-proof in operation because safeguarded against changing conditions and emergencies.**

**An outfit in which is the cause of burned out motors, blown fuses, etc. is definitely eliminated, because equipped with the Usaco Patented Unloader which permits motor to start without load.**

**An outfit that will not overheat because it is amply lubricated and equipped with numerous cooling fins and fan blade fly-wheel.**

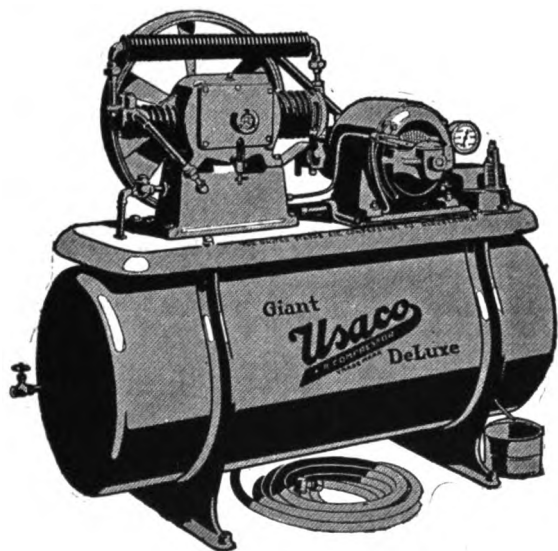
**An outfit selected as the best available by a majority of establishments, the adopted standard of many international corporations, the Government's choice for war service.**



THE two Usaco De Luxe Air Compressors illustrated are the leading units of the Usaco Line, containing machines adapted for every existing need. They embody all the advantages mentioned and differ only in compressing ability and tank capacity.

The **Usaco Standard De Luxe** has a capacity of 4 cu. ft. per minute, and a tank capacity of 30 gallons, suitable for 200 pounds working pressure.

The **Usaco Giant De Luxe** has a capacity of 7 cu. ft. per minute and a tank capacity of 60 gallons, suitable for 250 pounds working pressure. Both units are also furnished mounted on wheels so that they may be easily moved to the cars or other departments, if desired.



Above is illustrated the Usaco Unloading Device, which all familiar with electric motors will appreciate as invaluable and in fact essential to satisfactory operation. It is obtainable only on Usaco Compressors because amply covered by patents.

**The United States  
Air Compressor Co.**  
6542 Carnegie Ave. Cleveland, Ohio

## Garageman and Tractor Service.

(Concluded from page 21.)

ings are stressed to the limit and if lubrication fails for two or three minutes, they are ruined. All this may happen no matter how well the tractor is designed.

The tractor is constantly working under full load, and in addition under very dusty and sandy conditions which decrease the life of the engine and tractor parts in general. It is estimated that the plowing of one acre is the equivalent of 100 miles with an automobile.

Realizing the severe conditions under which the tractor must operate and the resultant loss of time if anything goes wrong, it is well for the repairman to bear in mind that the work must be done accurately and satisfactorily.

### Service.

Service, to be the right kind of service for tractor owners, must be:

Handy—a matter of hours, not days. When the farmer's tractor balks or breaks down, he wants it repaired at once—not next day or next week. There is nothing to take its place and the farmer is helpless.

Certain—available not only this week or next, but all the time, and by competent persons.

Quick—that is, it must be rendered systematically with the least amount of lost time, with the necessary equipment and parts for the work.

Satisfactory—rendered with an intimate personal acquaintance with the working parts on the tractor, and with accuracy.

In order to give this service handily, you must be available for this work when called on and should have a service truck or automobile to carry you to your destination quickly.

To make the service certain, you should prepare for year-round tractor work. You should study the tractor, and systematize your procedures in locating troubles, and standardize your methods in making repairs and overhauling. You should obtain the necessary equipment so that the work can be done quickly and at the same time efficiently.

Above all, it is very essential that the work be done satisfactorily. Pains should be taken to see that all work is done accurately because the tractor works under very severe conditions and slipshod work and carelessness will result in serious trouble. Every piece of work should be carefully examined to insure satisfaction.

### Locating Troubles.

In locating troubles, too much emphasis cannot be placed on what can be called "speed." If the farmer is plowing a field and suddenly his tractor balks, spits, and finally quits, think of the loss of time, if the trouble is not traced to its source in a hurry.

And yet, these troubles are not easy to locate, because there are a number of different conditions that produce the same symp-

oms. Granting, however, that the troubles are hard to locate, one cannot at the same time refrain from mentioning that over 50 per cent of the repairmen spend too much time in tracing these troubles, because they have no definite method, no system. Today, certain symptoms will have such a procedure, tomorrow the same symptoms will have another procedure.

To facilitate the location of tractor troubles, a chart has been prepared, and is published in this issue.

This chart gives the different tractor troubles: it has been so divided that a ready reference may be made for the purpose of tracing down trouble in any part of the tractor.

Most of the troubles met with in tractor operation are either due to derangements in the power unit itself or the power transmission assembly.

Engine troubles are mostly due to faulty carburetion, ignition, or lubrication. Never try to force an engine to run—a few turns of the crank will do as much good as a hundred.

In handling these troubles, a good deal of thought and judgment should be used. A careful deliberation and diagnosis without jumping at conclusions will surprise you with the ease with which most minor adjustments can be made.

It is a well-known fact that more perfectly good gas engines are ruined through the excessive use of the screwdriver or monkey wrench than by any other thing. Many delicately assembled parts are thrown out of order by a little tinkering. Think before you act; diagnose the symptoms and then proceed to locate the trouble—but above all, be systematic.

Begin your examination with the simplest and most probable causes and gradually work up to the more difficult ones; but be thorough and systematic. Don't try a sparkplug, and then leave it to test the carburetor, coming back later to work on the ignition. Stick to the one thing you have started and stick to it to the end. It is the only way you can successfully locate troubles, whether it be with a tractor, farm-electric plant, or automobile.

## Blind Soldiers Are Learning Automobile Repairing at Baltimore.

"Simple—I could fix that engine with my eyes shut."

So spoke the mechanic, impatient with what seemed to him the stupidity of his assistant. The mechanic didn't really mean it. With his eyes shut, he would have been helpless. Not so with the expert automobile repairers at the Red Cross Institute for the Blind at Baltimore, Md.

These brave fellows find, since that memorable day on the battlefield when they last saw light and color and form, that they must do everything "with their eyes shut," but a number of them, nevertheless, have become expert mechanics. These soldier-repairmen can call any part of the automo-

bile by name. They understand the construction of all parts, they know the troubles to expect, and understand the nature and making of repairs.

All this is part of the training they receive in the large automobile repair shop located on the grounds of the Institute at Baltimore.

The practice work is supplemented with talks on the design and principle of modern gas engines, carburetion, ignition systems, cooling systems, and lubricating systems. Vulcanizing and the repair of automobile tires also are included in the practical work.

Automobile repairing is not the only craft which flourishes at Evergreen. Every blind man has his peculiar aptitude, and the occupations taught at the school are as varied as the tastes of the various students. Insurance salesmanship, poultry raising, general farming, bookbinding, merchandising, carpentry, and a dozen other professions are taught there.

Courses of instruction in basket-weaving and hammock-making, staples of instruction for the blind, are included in the Evergreen curriculum. While most of the students take up this branch of work with considerable success, it is used only as a fundamental finger training. Many of the Evergreen graduates are engaging profitably in their chosen professions, learned at the Institute.

More than 200 American soldiers were blinded in the World War and already more than half this number have passed through the course of training at Evergreen.

## Automobile Transfer Law to Prevent Theft in Nebraska.

Under a new law that went into effect in Nebraska on January 1, it will be impossible to sell or trade a car without making a transfer. It is the confident expectation of the authorities that it will greatly limit the number of cases of automobile theft.

All transfers of used cars shall be made upon the reverse side of the certificate belonging to the car. In registering new cars, each applicant gets a new plate, a seal, a container, and a certificate. The latter is placed in the container and the container fastened on the car. In renewing old numbers, the applicant receives only a seal, a container, and a certificate.

No one will be assigned a number for a car, which has not previously had a certificate assigned it, before he presents a proper form of transfer from the dealer from he purchased the car. These blanks act as a bill of sale or deed to the car and dealers are expected, because their use protects his customer, to see that these regulations are observed.

Applicants for the registration of cars registered in other states are compelled to show proper proof of ownership before being given a Nebraska number.



# The COFFIELD TIRE PROTECTOR

*makes-*

**COFFIELD  
PROTECTOR**

*any tire wear longer*

## DEALERS Who Sell Them ARE Most Enthusiastic—as are those who use them

Most Every Tire nowadays is well built and will give thousands of miles of wear IF—

You are fortunate enough not to damage the Tire by stone bruises, running flat from a puncture or something of the kind.

But how many tires have to be discarded because the fabric is damaged long before the tread is worn through to the breaker strip!

The "Coffield" Protector is not a cure-all and is not intended to be put in damaged or worn out tires. It is for use in NEW TIRES or TIRES THAT ARE SOUND. When used in this way the Coffield Protector will make any tire deliver one mile of service for every mile of wear there is in the tread, BECAUSE:

It prevents punctures,

Eliminates Stone-Bruises.

Reduces Blow-Outs to a minimum.

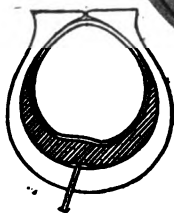
The "Coffield" Protector is made of pure, live rubber—has no fabric of any kind in it—and fits inside the tire like a glove. There is positively no friction and it is a protection both to the inner tube and the casing.

The first cost is the only cost, because the "Coffield" is used over and over again. Put it in a new tire—wear the tire out—then put it in a new tire again. It will save its cost on the first tire you put it in by the extra wear it causes the tire to give—saying nothing about the trouble saved from punctures and blow-outs. One set of "Coffields" will outlast all the tires ever used on any car.

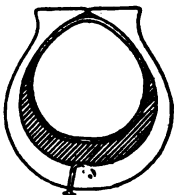
## ACTIVE DEALERS

Wanted for Open  
Territory

**The Coffield Tire Protector Co.**  
Dayton, Ohio



The nail goes thru the outer casing.



But the live rubber of the Coffield Protector (having no fabric) merely gives when the nail strikes it—and the nail clinches between the Protector and the casing.



Stones and other obstacles will not bruise a casing equipped with the Coffield Tire Protector—as the blow is distributed and absorbed by the entire casing rather than any one spot.

**CLIP AND USE THIS COUPON**  
**THE COFFIELD TIRE PROTECTOR CO.**  
 31 Court St., Dayton, Ohio.  
 Please send us, without any obligation, your proposition to  
 DEALERS—  
 Name \_\_\_\_\_  
 Address \_\_\_\_\_

**TRACTOR TROUBLE CHART.***(Concluded from page 23.)*

14. Too light a lubricating oil.
15. Piston-ring slots in line.
16. Leaky piston rings.
17. Carbon or dirt on valve seat.
18. Not enough tappet clearance.
19. Leaky exhaust or inlet valves due to carbon deposit.
20. Stuck or bent valve stem.
21. Weakened or broken valve springs.
22. Warped valve.
23. Weak piston rings.
24. Broken piston rings.
25. Clogged exhaust.
26. Scored cylinders.
27. Valves not properly timed after overhauling engine.
28. Excessive friction from tight adjustments after overhauling.
29. Brakes dragging.
30. Clutch slipping.
31. Pulleys not the proper size on driven machinery.
32. Clutch shifting collar worn.
33. Fiber worn on friction clutch.
34. Holes in sides of valve cage have become turned so that they do not line-up with the holes in the bottom of the cylinder and restrict the suction and exhaust.

**Engine Back Fires.**

1. Weak mixture of gasoline or kerosene.
2. Dirty sparkplugs.
3. Impulse starter not set.
4. Inlet valves not closing properly.
5. Wires on wrong plugs.
6. Air trap in fuel line.

**Backfiring Through Carburetor.**

1. Intake valve (or valves) holding open.

**Muffler Explosion.**

1. Explosion in the muffler is caused by the passage of unburned mixture due to mis-firing in one of the cylinders, into the exhaust pipe and ignited by the hot gases of the following explosion or by the heat of the exhaust pipe.
2. Lean mixture.
3. Exhaust valve stuck.

**Engine Smokes.**

1. Mixture too rich (black smoke) due to poor carburetor adjustment.
2. Mixture too rich, due to fuel level in carburetor too high from improper seating of valve or worn valve seat; cork float waterlogged; copper float leaks.
3. Worn or broken piston rings.
4. Pre-ignition.
5. Too much oil (grey-blue smoke).
6. Poor oil.
7. Racing of engine.

**Engine Runs Too Fast When Load Is Off.**

1. Governor valve stuck on stem or bent.
2. Worn governor mechanism.
3. Throttle open too far. Idling set-screw on throttle set too far.

4. Reach rod too short from governor arm to governor valve.
5. Governor stuck.

**Clutch.**

1. Clutch slipping is due to worn clutch facing; oil or grease on the clutch face; weak main spring.
2. Clutch grabbing is due to too sudden engagement from too tight an adjustment, or dry clutch.
3. Collar runs hot due to tight adjustment, or does not lock; lever too tight.

**Noisy Gears.**

1. Hard grinding or humming noise indicates that gears mesh too close.
2. Clattering metallic noise indicates that gears are worn or running too far apart.
3. Stripped teeth.
4. Lack of lubrication.
5. Teeth burred.

**Difficulty in Shifting Gears.**

1. Burred teeth.
2. Binding of control levers or operating rods due to rust or dirt.
3. Misalignment of bearings.
4. Loose gears.

**Band Wheel Gets Hot.**

1. Brakes set too tight.
2. Clutch lever out of adjustment.

**Can't Stop Band Wheel.**

1. Brakes not set properly.
2. Clutch not properly adjusted.
3. Clutch lever out of adjustment.

**Tractor Sways.**

1. Wheel bearings need adjustment.
2. Loose wheel spokes.
3. Loose frame.

**Engine Operation Rules Issued to U. S. Aviators—Good Pointers.**

The United States government has issued engine rules to air service pilots. These are brief, to the point, and very instructive.

Starting out, the rules state that for an engine to give a maximum length of service, two things are essential: First, that it never be suddenly accelerated or decelerated; and second, that it never be allowed to race. The rules continue:

"In reference to the first point, sudden acceleration or deceleration of the engine causes sudden changes in temperature which result in warping of parts. Especially is this true of valves, and the majority of valve trouble is started this way. A very slight warpage of the valve will cause the valve to burn and a missing cylinder results. The extent of this trouble varies with different engines.

Sudden changes in temperature also set up strains in other parts which weaken them and may result in an injury.

With this in mind all pilots, on starting an engine, should warm it up gradually. It should idle just fast enough to keep all cylinders firing until the temperature is at least 60 degrees Cent.

In cold weather it may be necessary to run a little faster, but it must be remembered that when the engine is cold, the oil is thick and there is danger of cavitation in the oil line if the engine is speeded up.

When the engine is thoroughly warmed up, it may be gradually opened wide for a short time to insure that it is working properly, but continued running with open throttle on the ground will cause overheating."

Then the rules go on to explain the effects of throttling when taking off, in the air, gliding, and its effect on engine temperature, fouling of plugs, and the troubles which are liable to result.

Continuing, the rules state:

"A common mistake made in starting an engine is that of flooding. In cold weather it may be necessary to prime the engine, but this should not be overdone, as it is easier to overcome too lean a mixture than one too rich.

The Liberty may be primed by the use of the primer on the dash and the Hispano-Suiza through priming cocks on the manifold. The charge should be taken into the engine with the throttle nearly closed, and no time should be lost between the taking in of the charge and its ignition, as only a short time in a cold engine is sufficient to cause the 'fog' of the gasoline in the intake pipes and cylinders to condense.

The propeller should be 'placed' quickly and the pilot should be ready to turn the starting magneto as soon as 'clear' has been called. If the engine is flooded, it may best be cleared by turning the propeller backward.

In conclusion, it is desired to emphasize the fact that the engine's performance and length of life depend on the pilot.

If the engine is running all right when you take it—and an airplane should never be taken with the engine missing or failing to turn up to its proper r.p.m.—it will continue to do so, except in exceptional cases, if you handle it properly."

**Why Gasoline Should Be Filtered.**

The modern motor and improved carburetors have demonstrated beyond question their efficiency to any one handling gasoline successfully, and also the lower grades of motor fuel.

It is impossible to build a motor or to make a carburetor that will operate on water. For this reason, it is important that the lower grades of fuel, as well as the highest test gasoline, be free from water or other impurities. It is a difficult problem to keep moisture from gasoline, as it seems to absorb dampness from the air that effects a condensation which results in little beads of water which settle at the bottom.

Should a drop of this water reach the carburetor, it will hang on the needle valve and stop the passage of gas. The result is a spinning, sputtering motor that is likely to go dead, causing you to wonder why



**LOX-ON**  
TRADE MARK  
**LAIR CHUCK**  
*"DOESN'T RUB THE RUBBER"*



**H**EAD and shoulders above the new products of 1919 stands the record of the Whistler Pressure Regulator. Written up by the newspapers as a "wonderful boon to motorists" and featured in automobile show publicity, this product has been sold from Maine to California.

Such a marvelous record for a new accessory is a mighty guarantee for the future. It is proof positive that the Whistler has "made good" as one of the steadiest, most consistent sellers in the accessory dealer's store.

The Whistler pays for itself many times over in tire, time and trouble saving. Simply screw it on your regular tire valve. Start the air in. As soon as you have the correct amount, a cheery whistle announces "enough!" You can't put any more in.

**What a tremendous improvement over the old bothersome tire gauge. And the Whistler outlasts a car and is always correct.**

**The Whistler has a strong, well-planned merchandising service back of it. It is a proved money-maker and a certain seller. We will be glad to explain our advertising and dealer propositions. Write us or ask your jobber.**

**Automatic Safety Tire Valve Corp.**  
1765 Broadway, New York City



**Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.**

# Facts and Ideas for the Tire Dealer

## Biltwell Guarantees Cord Tire for 10,000 Miles.

An unusual cord tire guaranteed for 10,000 miles has just been announced by The Biltwell Tire & Rubber Co. of Akron. A few months ago The Biltwell Co. attracted national notice by announcing a guarantee of 7,000 miles on its fabric tires.

The most striking characteristic of the Biltwell cord tire is said to be its square-shouldered tread, which conveys an instant impression of extraordinary thickness. The result is a tread which even when the tire is brand new presents a very large area of traction surface. The square-shouldered tread also makes possible a deeper non-skid pattern and prolongs the non-skid quality of the tire for several thousand additional miles.

The Biltwell company, while one of the youngest tire manufacturers in the Akron district, is reported to have made great strides in production during the past few months. The latest type of labor-saving appliances are used throughout the Biltwell factory and the present factory will ultimately be only one of four similar units.

For trade prices and further information write to The Biltwell Tire & Rubber Co., Akron, Ohio, mentioning the American Garage & Auto Dealer.

## Tire Dealer Stages Unique Inner Tube Test.

Even the blazé Saturday afternoon shopping crowds on Euclid avenue, Cleveland, stopped and looked the second time as a big touring car rolled along having

distributor, who was steering the truck, applied the brakes on the truck, while the touring car moved ahead. With the increasing tension the tube stretched out 20 ft. or more before it broke. The crowd was satisfied.

Wm. C. Owen, president of The Owen Tire & Rubber Co., Bedford, Ohio, in speaking of the test said: "No motorist will ever be stung if he buys Owen tubes—this proves it."

## Knowing Your Stock.

BY FRANK E. MORRIS

*Manager Quick Tire Service, Dallas, Tex.*

Dear Ed: You know when a guy is in the automobile tire and free service business, which is what I am, he runs into a lot of things that ain't writ down in the book, which is the book of system they gives you from headquarters to work on. Take for instance, Ed., tires and tubes.

If you was to go out and employ a lot of ginks to work for you, white or black, you would give them a name if they ain't got one. If the stenog ain't in her place, you ask, "Where is Lilly?" Somebody answers, and says she is off for a funeral today, and so on. This, Ed., shows that you are watching to keep the hired help from eatin' more hay than they pay for, which is a good trait in any man who is supervisor of the ivory department.

So then if you know your help by name, and can check up when they are missing, you ought to know your stock the same way. When I hire Bill McCormick as such, he is always Bill McCormick, no matter how long he works at the shop.

just where they are, and why shouldn't you?

So I have invented a way Ed. which if all retailers would adopt the method, there never would be a casing or tube sold that was new stock when there was one that was older of the same kind and price in the shop. That you see keeps your stock always fresh.

Each day Ed. with my system, if a guy has sold Jack, when Bill or Lizzie ought of been sold, there is a check on him, and he gets called to his attention that he ain't treated Jack right, as Jack had a right to stay with us a few days longer. At the same time, he is told that Bill or Lizzie was discriminated against because they ought of been out on that sale, and runnin' around on a automobile wheel, which was their right ahead of Jack.

Then Ed. at any time you can just glance at your stock, and see what you have, which is what most people can't do with their stock. There ain't no good reason why they can't do it, but they just ain't discovered what I have discovered, which could of been discovered by any guy who used his noodle, because it is just a matter of common sense, and common sense means usin' your brain.

Then Ed. when it comes to takin' stock, where we used to spend hours worrying over differences, and finally givin' it up in disgust, and reportin' shortages here, and overs there, we ain't got that trouble now, and a stockkeeper has as much fun, and is as accurate as a guy which takes in the money at a bank. He is always in balance.

In one minute with my scheme, if a guy has bought a casing now or two years ago, I can turn to the books, and pretty nearly tell him the whole history of it.

Best of it is it don't add any work, but cuts down the work, and the worry, and the dangers of loss from stealing.

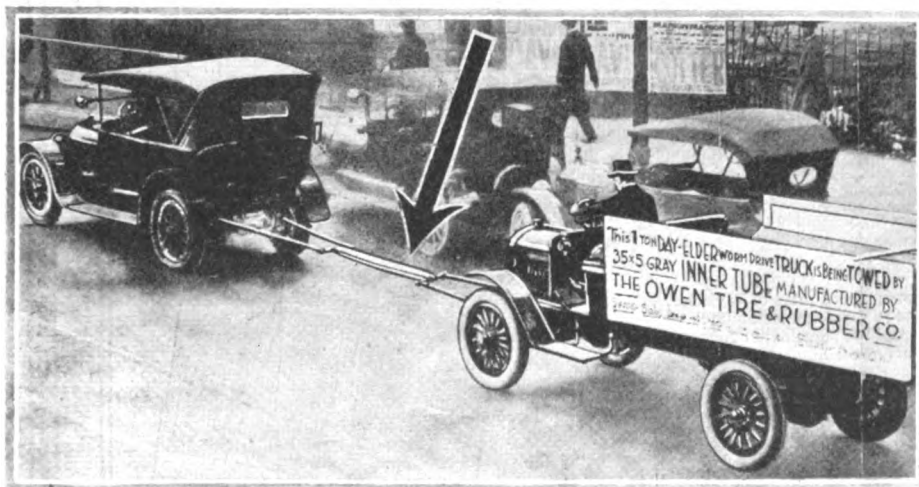
All I can say is that every guy in a business ought to have all of his stock inventoried like he keeps his employes, and have always at his command the power to tell when they came, when they were sold, and a world of other information that don't cost a cent to do, like which I have done.

Yours, Jack.

## Advertising Campaign for Dealers Conducted by Marathon.

This campaign is to sell you—the tire dealer—to the public.

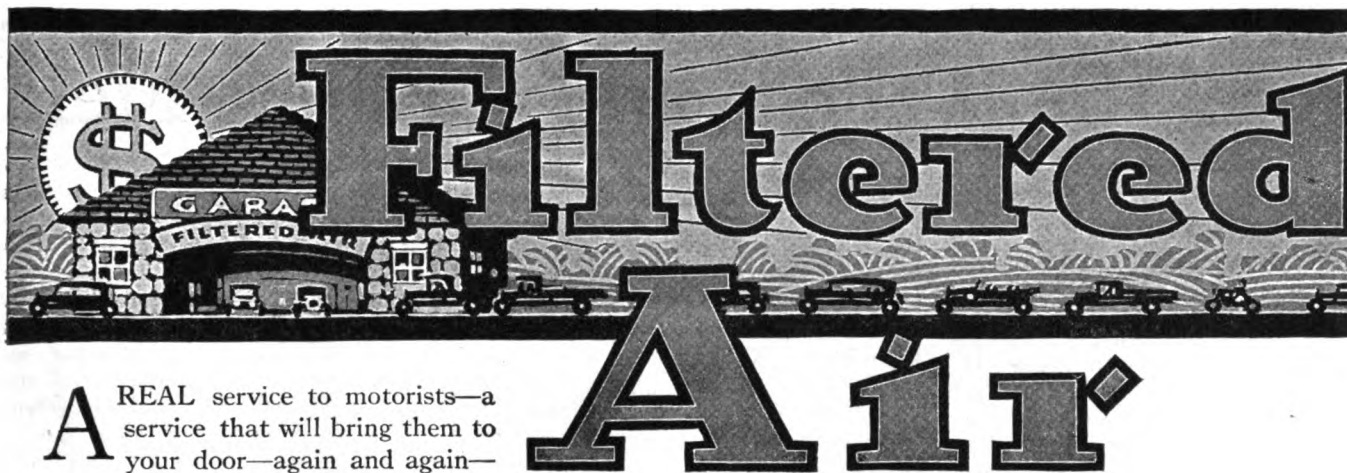
An attractive portfolio illustrating this campaign will be sent to dealers and distributors upon request. Address the Marathon Tire & Rubber Co., Cuyahoga Falls, Ohio, and don't forget to mention the American Garage & Auto Dealer.



Demonstrating the Resiliency of An Inner Tube.

a 1-ton Day-Elder truck in tow, and the tow line was an Owen inner tube. To prove there was no trick to it and that the tube was not specially built, the cars halted and Harry Young, the Day-Elder

A casing Ed. and a tube has a identity, and why not take 'em into stock just like you would employes, and as they move about in your store, or until they are sold out of store, you ought to be able to know



A REAL service to motorists—a service that will bring them to your door—again and again—that will keep them your customers—that will build the utmost good-will for your business. That's what "FILTERED AIR" will mean. It will increase your business surprisingly. A "FILTERED AIR" sign above your door will keep you in constant touch with all classes of motorists, creating an obligation on their part to become your customers.

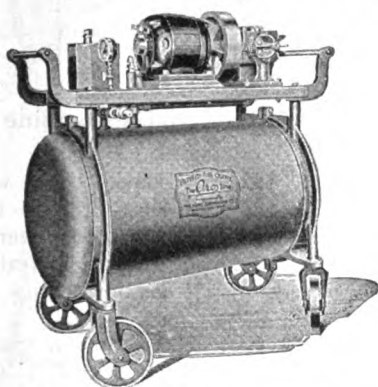
The No. 7 AU-TO AIR COMPRESSOR furnishes an abundance of perfectly filtered air. A special liquid takes out absolutely all dust and oil—the two worst enemies of tires. The air comes from the tank as pure and clean as from a mountain top.

This is a complete outfit in itself: motor, piping, valves, gauge, automatic unloader, automatic switch

*Ask your jobber, or write us, sending his name, if he cannot supply you. Now is the time to get this excellent business builder!*

## THE AU-TO COMPRESSOR CO.

304 S. Mulberry Street WILMINGTON, OHIO

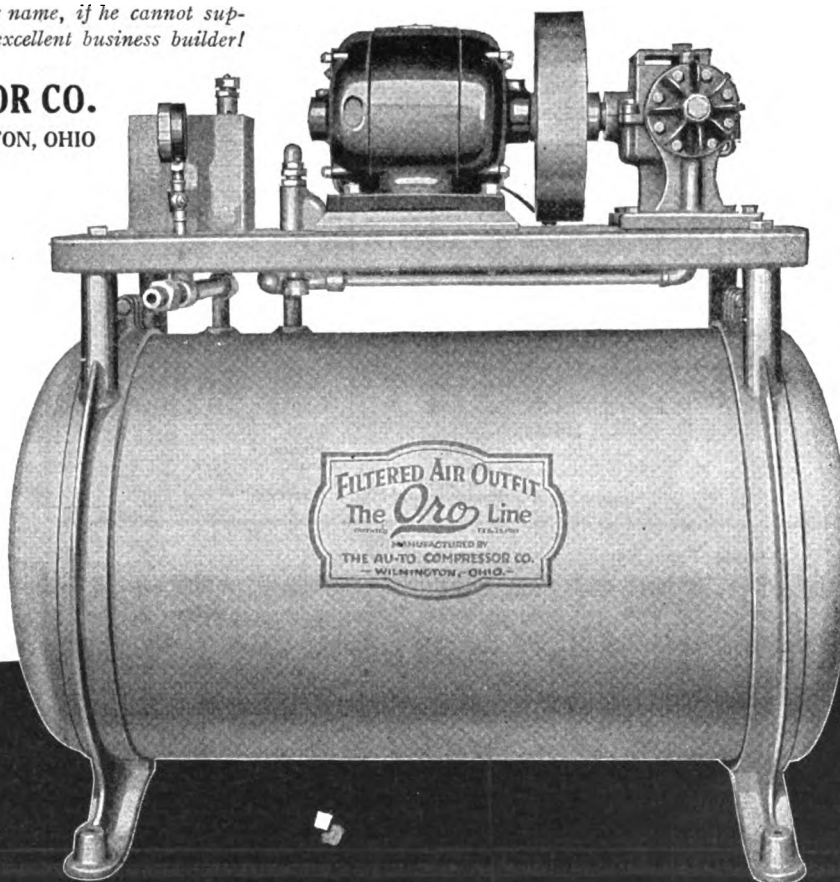


Model No. 8 Au-To Air Compressor—same as No. 7, excepting that it has large wheel casters, which make it easy to move from place to place in the shop or garage.

and tank—assembled and ready to run. The motor is only  $\frac{1}{2}$  horse power. This outfit requires no watching, no tinkering—the tank is kept full of filtered air, ready for motorists—day and night. This outfit furnishes a regular working pressure sufficient to handle the largest pneumatic truck tires.

## Only 3 Moving Parts!

In addition to the valves there are only 3 moving parts to the compressor mechanism. Such astonishing simplicity must mean durability and continuous satisfactory service. Of course, our regular guarantee of perfect service goes with this machine.



a sign like this



brings business.

# From the Truck and Trailer Field

## Trucks Do Not Turn Turtle When They Are Speeding.

The belief that heavy trucks traveling at a high rate of speed turn over when there is a tire blowout was entirely disproved by one of the transcontinental trucks of the Goodyear Tire & Rubber Co., Akron, O., while traveling with the First California Highway Motor Convoy, recently.

It is said that the truck was rolling along in excess of 30 miles an hour with a load of approximately four tons, on an extremely rough detour when the left rear tire blew. The truck showed no tendency to skid or keel.

## Truck Production Shortage Predicted for This year.

"The year 1920 promises to be one of record-breaking activity in motor manufacturing," says Geo. D. Wilcox, director of sales and advertising for the Commercial Motor Car Co., "and, if proper care is used, should yield large profits, both to the direct manufacturers and to those whose business is indirectly dependent upon them. The financial barometer points in such direction and in the same breath the warning is given that financial soundness should be absolutely the first consideration

2. The replacement demand from those who are discarding.

3. Export trade.

Financial circles place the 1920 demand as follows: Passenger cars minimum, 1,895,000; maximum, 3,070,000. Trucks, minimum, 325,000; maximum, 375,000.

For trucks, the ratio between the total number of trucks and total population will probably never be a significant figure. Certainly it will not be for a considerable number of years to come. The increases in the number of trucks in use has been as follows:

	Registration December 31	Increase for Year
1914.....	136,907	
1915.....	205,435	68,526
1916.....	301,321	95,886
1917.....	442,478	141,157
1918.....	593,092	140,614
1919(*).....	800,000	206,908

\*Figures for 1919 are based on official estimate.

## Success of Truck Operation Lies in Proper Cost Analysis.

Although the universal use of motor trucks for passenger and freight transportation is apparently inevitable, their success depends entirely upon certain elements of organization and operating meth-

who are operating successful bus lines.

The unsuccessful operator estimated the cost of gasoline, oil, tires, and driver's wages, and added to this his garage rent and interest on notes. On a basis of what this cost him, plus his profit, he found that he could charge a lower rate than his competitors. Successful operators know that expenses involving the following items must be taken into consideration:

### FIXED CHARGES:

Amortization (reserve for depreciation).  
Interest on investment.

Insurance: Fire, transportation and theft, public liability and property damage, collision.

Overhead: Administration requirements, taxes, licenses.

### MAINTENANCE CHARGES:

Garage: Rent, heat, light, power, etc.

Repairs: Material and labor, overhauling, painting, wrecking crew and equipment, mechanics and inspectors, battery renewal and charging.

### RUNNING COSTS:

Gasolene, oil, tires, wages of drivers, dispatchers, superintendents, etc., grease, kerosene and waste.

To calculate unit costs on which rates may be based, it is necessary to secure a report from each driver at regular intervals, covering the above items. A simple yet flexible form of monthly report, as shown, is that used by the Suburban Transit Co. of Plainfield, N. J. This company operates a fleet of 13 Mack trucks in the vicinity of Plainfield, and maintains a thoroughly up-to-date garage with storage and repair facilities.

MONTHLY REPORT											
Driver _____				Route _____							
Car _____				Month _____							
Day	Miles	Gasoline		Oil		Driver		Maintenance		Revenue	
		Gals.	Am't.	Qts.	Am't.	Driving	Work on Car	Labor	Stores	Chg. Fare	Cash Fare
1											
2											
3											
4											
5											
6											
7											
etc.											

SUMMARY:				Payroll:	Insurance:	
				Stores:	Garage:	
				Depreciation:	Misc.:	
				Tires:	TOTAL:	UNIT:

Simple Form for Monthly Report of Truck Driver.

in selecting the companies with which to do business."

The year 1919 was pre-eminently a "motor year" in the business world. Other lines such as building, textile, etc., showed activity which compared favorably with the immediate past, but in no other industry did the demand so decidedly surpass all previous records.

On the demand side, the motor industry for both passenger cars and trucks has three great heads:

1. The new demand from those who are not now owners.

ods. Truck operators of the present and of the future may well profit by the experiences of the so-called jitney lines that have failed through loose organization and cut-throat methods of competition.

The majority of these lines were operated by ex-chauffeurs and teamsters who, because of the liberal credit extended by truck dealers, could do business with very little capital. Although their equipment was in most cases inferior, they assumed that it could be operated for as little as the high-grade and more expensive vehicles that are found in the fleets of those

## Trucks and Good Roads Combine to Influence Land Prices.

The first American motor truck was made in Brooklyn in 1898. In 1914 the motor truck achieved a big success, but it took the war to make the public realize that it is one of the greatest means of transportation.

From 5,000 the number of motor trucks in use 10 years ago has increased to 500,000. It is estimated that the number of motor trucks to be manufactured and sold this year will amount to 350,000.

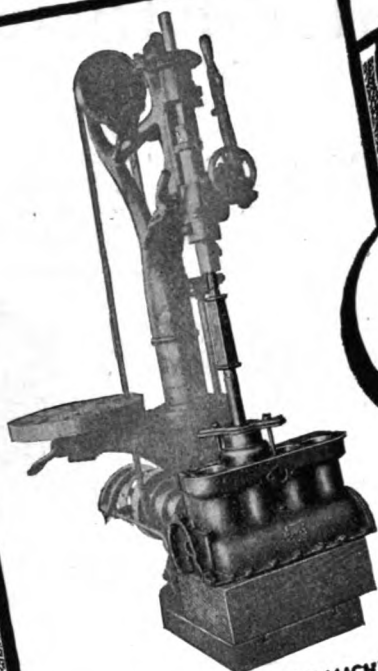
It is a matter of note that the biggest truck users are the farmers. To the public motor transportation appeals as a medium to lower living expenses. Motor express lines bring produce into the cities from farms within a large surrounding area, where it is sold at a reasonable reduction in comparison with produce transported by the railroads.

The remarkable progress of motor truck transportation makes it necessary to build roads to carry the loads.

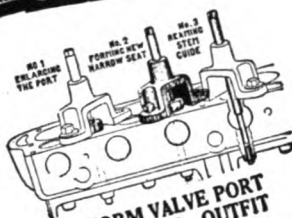


# STORM

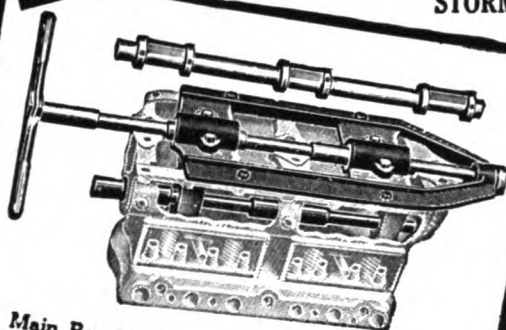
## MOTOR REPAIR EQUIPMENT



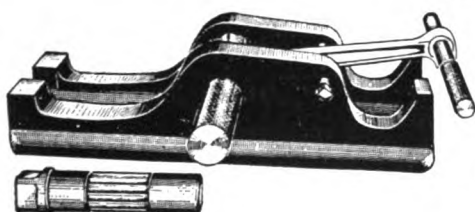
STORM CYLINDER REBORING MACHINE



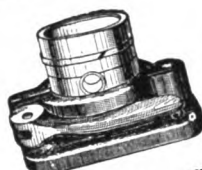
STORM VALVE PORT RENEWING OUTFIT



Main Bearing Babbitting and Boring Tool



THE STORM CONNECTING ROD BEARING REAMER, JIG AND STRAIGHTENING GAUGE.



The Storm Piston Vise

**These STORM tools, all of which are money-makers for the garage will interest YOU.**

**YOU** garage owners and repair men can "cash in" big *right now* if you are equipped to properly handle the motor rebuilding work in your community. Now is the time to prepare for thorough overhauling and rebuilding. Change the usual dull winter period into a busy, profitable season. But you can't do this without proper tools. Storm Tools have been designed and are built by practical men. They are guaranteed to increase the efficiency, speed, accuracy, and profit of your work.

**Get the Reputation for Doing First-Class Work!**  
**STORM Motor Repair Equipment Will Make That Reputation for You**

STORM Reboring Machines are made in a variety of capacities—for hand or power operation—are inexpensive and can be handled with accuracy and speed by unskilled help.

Don't send your reboring, the most profitable and important part of the work, out to others. Do it yourself and double your profits.

The STORM Valve Port Renewing Outfit produces *new* valve systems on old Ford motors. The STORM Main Bearing Babbitting and Boring Tool makes *new*, *accurate* main bearings on Ford and Fordson motors.

Fill out the coupon—let us send you further particulars.

### STORM MFG CO.

Department E  
**MINNEAPOLIS MINN.**

STORM  
 Mfg. Co.  
 Dept. E  
 Minneapolis  
 Minn.

Send us catalog. We are interested in—  
 STORM Cylinder Re-boring Machine.  
 STORM Piston Vise.  
 STORM Valve Port Renewing Outfit.  
 STORM Connecting Rod Bearing Reamer, Jig and Straightening Gauge.  
 STORM Main Bearing Babbitting and Boring Tool.

Name .....

Address .....

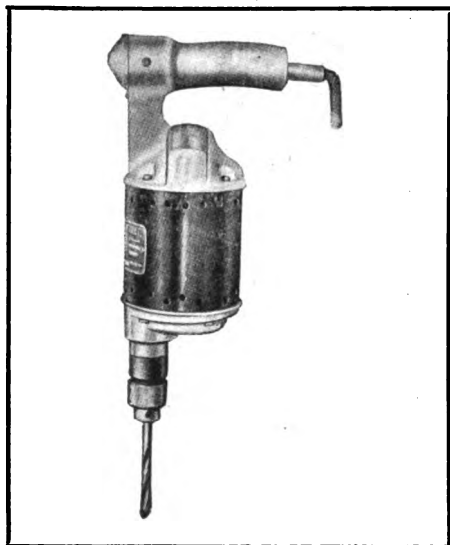
Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Garage Equipment for Better Efficiency

## Serviceable, Portable Electric Drill for Repair Shops.

Portable, electric drills that are labor, time and money-savers, are being placed on the market by J. C. Campbell.

In designing these drills, special attention has been directed toward the preven-



A Time-saver—The Electric Drill.

tion of stalling, the common annoyance of most drills. It is claimed that the "Electro" is very easy to handle and so constructed that the weight is evenly distributed to make the machine perfectly balanced, a feature which workmen will surely appreciate.

The gear housing is entirely separate from the motor, with the gears running in lubricating grease. The finest materials are used throughout its construction, and it is sturdily built by mechanics, for mechanics.

The wound armature is said to be well

balanced and highly efficient, and adjustable ball bearings are used on the armature shaft. The three-jaw type chuck insures a positive grip and long life. This is a type of tool that every up-to-date, progressive repair shop should have; it enables you to do work, a variety of work, quickly, and at the same time more efficiently and accurately.

Write for prices, specifications and details to J. C. Campbell, 20 E. Jackson Blvd., Chicago, mentioning the American Garage & Auto Dealer.

## Large Battery Charging Set Developed by Hobart Bros.

In response to the general demand for a battery charging equipment of extra large capacity, suited to the needs of large battery service stations, Hobart Brothers Co. has developed a new outfit which is said to be capable of charging 70 batteries at one time. Heretofore the largest charging set sold under the "HB" trademark has been an outfit with a 32-battery capacity, but the enormous increase in the need for first class battery charging service caused by the increase in the use of automobiles has made it necessary for battery service men to have larger charging capacity to take care of their customers.

The new HB outfit has a capacity of from one up to 70, six-volt batteries, or their equivalent in various voltage cells. Five charging panels are furnished, carrying from 1 up to 14 batteries on each panel, enabling the service station to give individual attention to batteries in all stages of charge—a most important feature in successful battery charging.

The outfit is amply designed throughout, being equipped with a  $7\frac{1}{2}$  h. p. motor, operating on two or three-phase, or direct current. The generator is of 5 kilowatt capacity, and will furnish up to 16 amperes. SKF ball bearings, which add greatly to the efficiency and life of the outfit, are used. An additional big feature is the automatic voltage control device that is used on all Hobart chargers.

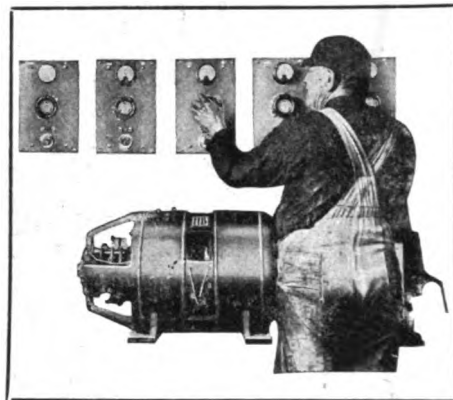
This 70-battery charger is sold on the manufacturer's easy payment plan, enabling the purchaser to install the outfit and pay for it out of the profits on battery work. Full details will gladly be sent on request. Address the manufacturers, Hobart Brothers Co., Troy, Ohio, and mention the American Garage & Auto Dealer.

## Tool for Every Mechanic's Tool-kit—the Victory Ring Compressor.

"Here it is! Another labor-saving device for every automobile mechanic," says the Victory Piston Ring Compressor Co.,

of its product, the Victory ring compressor. That it is absolutely the only compressor invented which is instantaneously adjustable to fit all size automobile piston rings is the further claim of the makers.

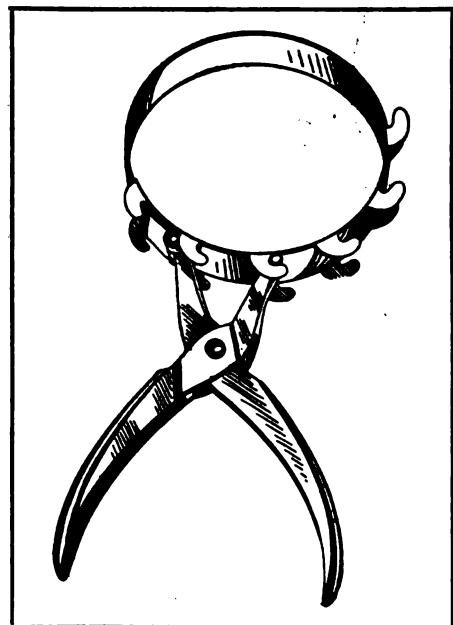
This compressor is designed for use on



New 70-Battery Charger.

all types of motors for inserting pistons into either the top or bottom of the cylinder. To operate, the piston is inserted into the cylinder, the steel band of the compressor is then placed over the piston rings, and the piston pushed into the cylinder.

That it eliminates breaking of piston rings, prevents injury to operators' hands,



New Ring Compressor.

and enables one to perform this hitherto disagreeable operation with speed and pleasure are stated to be particular features.

Trade prices will be given to those writing the Victory Ring Compressor Co., 320 N. Michigan Avenue, Chicago, mentioning the American Garage & Auto Dealer.

## Inquiry Coupon.

Readers of this paper are invited to ask us for information concerning anything described in its pages or about any motor vehicle parts or accessories. This information will be furnished whether or not the requests come from subscribers.

American Garage & Auto Dealer,  
116 S. Michigan Avenue,  
Chicago, Ill.

Please supply me with information as to trade discount and nearest source of obtaining the articles given below:

.....

.....

.....

Name.....

Address.....

# Two Big Elements

## In Every Spring Sale

WHEN you sell the motorist a spring his safety as well as his comfort should concern you. Comfort and safety are the two most important elements in every spring sale—and safety is the consideration on which the dealer's great responsibility rests.

The Harvey standard protects the dealer by making sure of the motorist's safety as far as his springs are concerned. The unusual strength and easy riding qualities of Harvey Springs are the result of a determined effort to produce a spring in keeping with the progress of the automobile industry.

Through this achievement, Harvey Springs not only provide greater safety and comfort but minimize the wear and tear on the mechanism and the tires. And the dealer can sell these superior springs with convenience and profit.

Harvey dealers are well supplied with sales helps, movie slides, window decalcomanias and inside wall posters as well as the helpful Harvey Book.

**Harvey Spring & Forging Co.**  
1041 17th Street  
Racine, Wis.

# Harvey

## RACINE

Write for the free Harvey Book containing specifications for more than 1000 Harvey Springs.

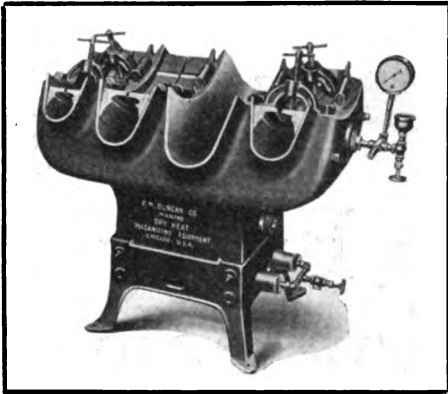
# SPRINGS

Easy Riding—Guaranteed

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

### Duncan Sectional Moulds Embody Interesting Features.

The F. M. Duncan Co. has recently put on the market new sectional moulds for tire rebuilding. A prominent feature of these



Sectional Moulds for Tire Rebuilding.

moulds is the flexible character of the cavities.

The Duncan moulds have cavities with sloping instead of parallel sides. This construction brings the side plates into contact with the side walls, which are also on a slope.

The construction of the cavities also eliminates much of the labor attendant to "setting-in" and "taking-out" of the tires. The ease of setting the side plates is claimed to overcome the usual difficulties experienced with straight-sided moulds. The operator can see the exact space the tire and air bag will occupy; preventing possibility of pinched or buckled fabric in setting the side plates.

The sloping sides of the side walls also



Workrite Battery Hydrometer.

are said to prevent a "dead-pocket" of steam forming. The steam plates of the Duncan sectional mould being wide, permits rapid circulation, thus adding heat units more quickly to the cavity sides of the mould and uniform heat at all points.

The moulds are equipped with a dimin-

ished heat and cold end extension doing away with "offsets," nor do impressions of the moulds appear on the tires.

The gas burners furnished with these moulds will supply heat in about 40 minutes. They are supplied with a special gas valve to maintain an even pressure.

Duncan sectional moulds are furnished in two types—3-cavity and 4-cavity. Full information may be obtained by writing to the F. M. Duncan Co., 114-116 E. Ohio St., Chicago, mentioning the American Garage & Auto Dealer.

### New Hydrometer Outfits for Garages and Battery Stations.

"Grab it out and drop it in. It will not break." That is the new Workrite hydrometer outfit for fast and accurate work in garages and battery stations manufactured by the Workrite Mfg. Co.

The mouth of a gallon water jar is lined with soft rubber, making it possible to "grab out and drop in" the hydrometer without danger of breaking. Plenty of clean water is easily carried to the car, and the hydrometer is at the same time safe and clean.

A large pear-shaped bulb, made from almost pure gum, is attached and will stand the wear. The carrot-shape glass barrel insures free floating of the hydrometer and is made of thick, tough glass.

A Workrite hydrometer outfit for individual motorist's use and an outfit for use with house-lighting plants is also manufactured by the company.

Those desiring trade prices should write to the Workrite Mfg. Co., Cleveland, Ohio, mentioning the American Garage & Auto Dealer.

### Cylinder Gage Which Should Appeal to Garage Mechanics.

A cylinder gage designed to take the place of internal micrometers, which are so confusing to the majority of garage mechanics, is marketed by the American Machine Products Co.

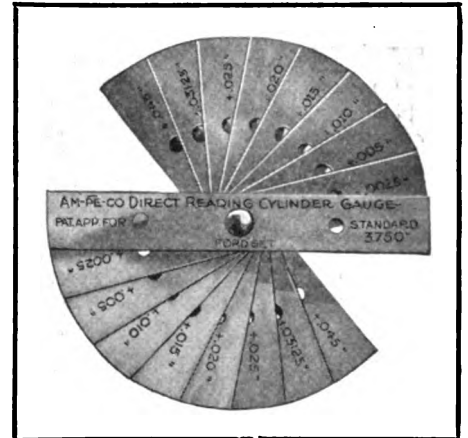
The makers state that this gage is made of hardened and polished steel. Each blade is ground true to its designated length by revolving on centers, so that the whole arc of the blade can be used in measuring. By the selection of the proper blade, a quick and correct reading of the oversize is made.

The simplicity of this cylinder gage appeals to all garage mechanics because it eliminates the possible uncertainty in micrometer reading, and for the fact that it quickly gives (plainly indicated) the correct measurement.

The American Machine Products Co., Marshalltown, Iowa, will be glad to give trade prices and further particulars to those writing them. Be sure to mention the American Garage & Auto Dealer.

### A New Compressor Built Along "Different" Lines.

For the past few years the Jackson Compressor Co. has been working on several types of compressors with the view of

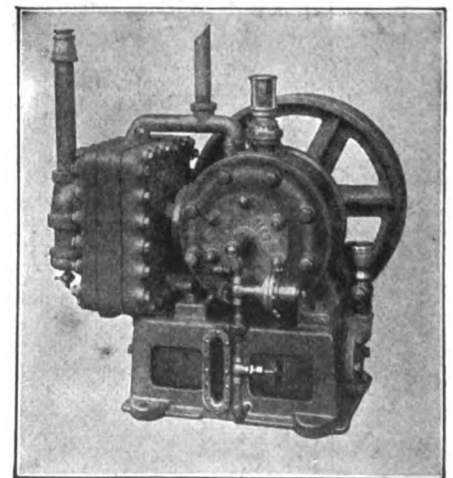


Simple Cylinder Gage.

bringing about refinement, simplicity, and greater efficiency. The company feels that the compressor which it is now placing on the market embodies these important characteristics.

It is of rotary type, has only five moving parts necessary to compress air. A like number of parts make up the cylinder and base. That it is light in weight, easily installed and operated are features which are sure to appeal to all prospective purchasers.

The advantages, 15 in number, which the manufacturers claim for their compressors are: very simple in construction; greater range of speed; higher driving efficiency; direct connected; saving in power and upkeep; light weight; small in size; easily installed; easy to start; high volumetric



Efficient Rotary-type Compressor.

efficiency; simple and efficient lubrication; reduced friction; no valve trouble; thoroughly tested; guaranteed.

Write to the Jackson Compressor Co., Inc., 235 South Cherokee street, Denver, Colo., for further particulars, mentioning the American Garage & Auto Dealer.



## An up-to-date National Cash Register gives a merchant control of his business



**I**T forces each clerk, or the merchant himself, to make a record of every sale he handles. The record must be complete before change can be made or the transaction finished.



The record of each transaction is brought to the attention of the customer in two ways. By the electrically lighted figures at the top of the register and by the printed receipt which she receives.



The record is also printed and added automatically at the time the transaction takes place. These accurate records are the foundation of good storekeeping.

A merchant must have such records to control his business and to make up his income tax report. An up-to-date National Cash Register gives them to him cheaply, accurately, and quickly.

The National Cash Register Company, Dayton, Ohio  
Offices in all the principal cities of the world

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Accessories — They Bring in Money

## New Lightford Piston Manufactured by G. H. Dyer Co.

"Decrease the crank shaft, wrist pin, connecting rod, piston and cylinder wear! Decrease the vibration of the car, the gasoline and oil consumption! Increase the speed and the acceleration!" That is what



New Lightweight Ford Type Piston.

the G. H. Dyer Co. says its new Lightford piston will do.

The company has manufactured three types of lightweight Ford type pistons in the past. These types, the makers state, have not entirely satisfied them. In the new piston the company officials feel that they have made an improvement of 50 per cent in the mechanism and 100 per cent from the standpoint of sales.

This piston is almost identical in appearance, construction and design with the Ford Motor Co.'s piston, having the same head, 2 1/4-inch rings above the pin and one below and bronze pin bushing, but is one pound lighter, reducing by four pounds the weight of the reciprocating parts, and greatly increasing the efficiency and life of the engine.

That the piston is tough, durable, absolutely round, perfectly machined that it has uniform walls, special oiling features

trade prices and further particulars to those writing them, mentioning the American Garage & Auto Dealer.

## Safety Traffic and Danger Signal Devised by Wright Company.

"Prevent the man behind from damaging you and your car," is the slogan which the Wright Traffic Signal Co. has adopted in marketing its new traffic and danger signal.

At night the tail light, shining through the white translucent glass of the signal, onto a red arrow which points this way and that as the car moves, makes it possible for the man behind to clearly see every movement.

The Wright signal is operated quickly and easily by moving a ratchet lever located six inches under the steering wheel.

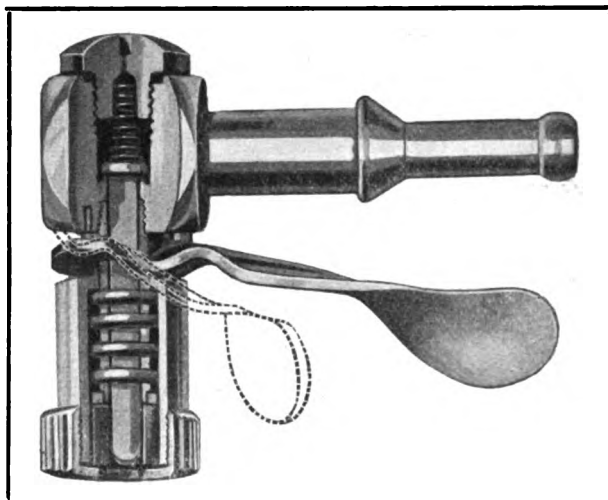
Three important features are pointed out by the manufacturers in describing their product. First, it can be seen half-way down the block. Secondly, it signals all five movements of the car—forward, right turn, left turn, stop and back up. Thirdly, there is no expense involved in its operation.

The tail light burns anyway and this light illuminates the signal at night. No electric wiring is required, and by day no illumination is necessary. The device is simply fastened on the rear fender, the tail light shining through on the red arrow.

To prevent mishaps at all times, especially when a car is curtailed or enclosed, this device should prove most valuable. Dealers will be interested in the dealer's propo-

## New Air Chuck that "Doesn't Rub the Rubber" Introduced.

The manufacturers of the well-known "Whistler" tire valve are placing on the market the Lox-on air-chuck, guaranteed to put an end to all air compressor troubles, to cut the repair and electric bills, and to absolutely stop the expense and



Air-chuck for Tire Inflation.

nuisance of replacing rubber washers every day.

This device does not push on over the valve stem like other chucks, the makers say. It doesn't wear out the washers from rubbing against the valve threads. It simply slips over the valve and grips it, or releases it by turning the lever.

The rubber cylinder which forms the lining of the valve does not wear away because it does not have to be pushed or pulled over the valve threads. It is positively guaranteed not to leak, and that means that the compressor does not have to keep going all of the time in order to keep the pressure up.

All parts are accessible and interchangeable, and the chuck is designed to last indefinitely.

"It is the little thing that counts," and the manufacturers say that you will be amazed to see what a big difference a little thing like an air chuck can make in a garage or air-station. The saving in air when the Lox-on is used will more than pay for it in a short time.

Of course, dealers and garagemen will be interested in the Lox-on. It is something entirely new.

Don't forget to write to the Automatic Safety Tire Valve Corp., 1765 Broadway, New York City, for trade prices and full particulars. Don't fail to mention the American Garage & Auto Dealer when you write.



Wright Safety Traffic and Danger Signal—Operated From Steering Wheel.

and is accurately fitted with special lap joint rings, are points of importance mentioned by the manufacturers.

The G. H. Dyer Co., 155 Brookline St., Cambridge, Mass., will be glad to give

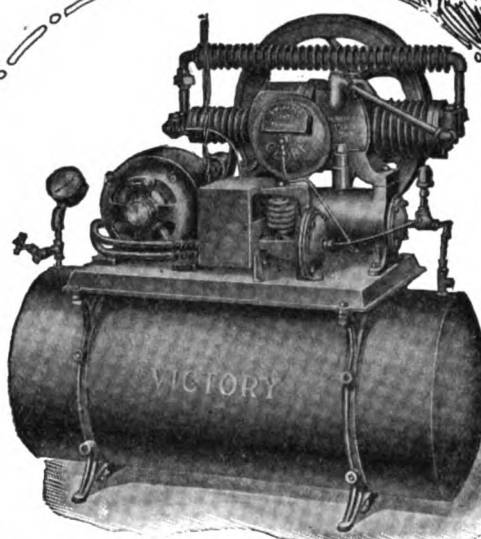
sition which can be obtained from the Wright Traffic Signal Co., 132-134 Opera Place, Cincinnati, Ohio. Mention the American Garage & Auto Dealer when you write.

# Another great victory for Garagemen through **GLOBE** TWO-STAGE AIR COMPRESSORS

When pneumatic tires for trucks came into general use many garages and service stations were "up against it." Their air equipment was not capable of inflating the giant truck tires. They were obliged to see the trucks go elsewhere, not only for their "free air," but also for their gasoline, oil, parts and accessories.

But the garage with a **Globe Air Compressor** had nothing to worry over. These powerful two-stage compressors furnished ample pressure for inflating the heaviest truck tires. The garageman with the GLOBE not only held his truck patronage, but greatly increased it, as his air service drew trade from his less enterprising competitors.

*Is your air equipment equal to the present demands? If not, write today for Globe literature.*

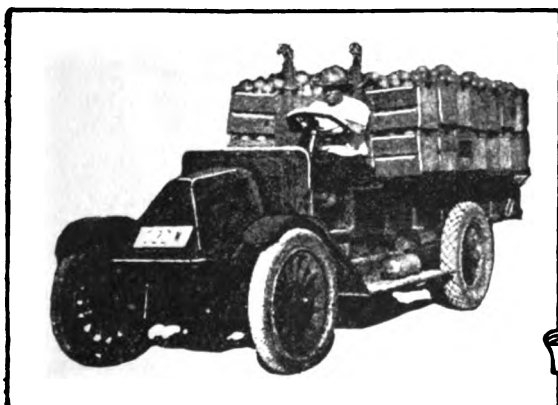


"VICTORY" Complete Automatic Motor Drive Unit

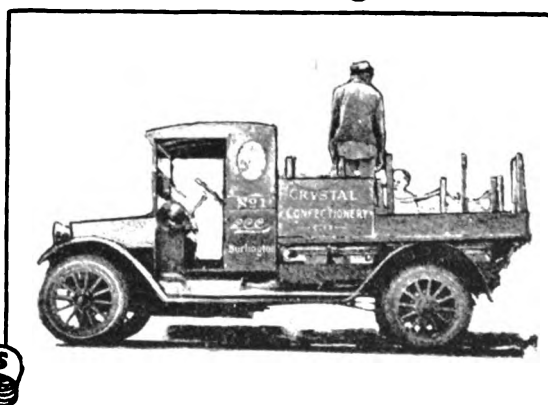


## GLOBE MANUFACTURING CO

Battle Creek Michigan



PNEUMATIC  
TIRED TRUCKS



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

### Replacement Parts Manufactured by Spencer Metal Products Co.

A line of replacement parts comprised of drive shafts and axle shafts for all popular makes of cars, connecting rods, ra-



One of the Spencer Products.

dus rods, and mufflers for Fords, and taper roller-bearings for light cars and trucks, are being manufactured by the Spencer Metal Products Co.

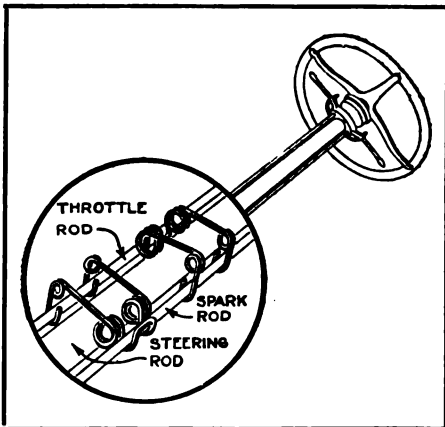
No effort has been spared, the makers state, to build quality into every Spencer guaranteed product. No machine that makes for greater accuracy is too expensive to be installed in the modern Spencer factory. These products are sold through jobbers exclusively. The great demand for replacement parts makes the Spencer line of instant interest to jobbers and dealers.

Write for particulars concerning these products to the Spencer Metal Products Co., Spencer, Ohio. Don't fail to mention the American Garage & Auto Dealer.

### Anti-Rattlers Placed on Market by Handy Mfg. Co.

Handy brake-rod anti-rattlers, as the name implies, take the rattle out of brake-rods, which most cars, especially at high speed, have. A car usually requires four of the silencers. They can also be used for valve silencers in valve-in-the-head motor, says the Handy Mfg. Co., the maker.

Another device, the Handy throttle and spark-rod anti-rattler, for use on ignition



Throttle and Spark Rod Anti-Rattler.

and throttle rods, has also been introduced by the manufacturer.

In addition to the brake-rod anti-rattlers and the throttle and spark-rod anti-rattler, the company makes anti-rattlers for tie

rods, big brakes, and Overland gear shifts, also a steering arm shock absorber, steering wheel clutch, a 490 Chevrolet lock and a "money-back" gas saver.

A folder will be sent to those writing the Handy Mfg. Co., Grand Rapids, Mich., mentioning the American Garage & Auto Dealer.

### Motor Heater Designed on Principle of Hot Water System.

Installed in the circulating system of an automobile, the new Mayall motor heater is guaranteed to keep the motor warm and ready for instantaneous service in any weather, in any garage. It is manufactured by the Knight Metal Products Co.

This heater was invented by Major Wm. Mayall, British Motor Transport, while on active service. The original design was used extensively and with complete success by Major Mayall on army motors, and is now perfected and patented and adapted for use on passenger and commercial cars.

It is an electrical device, easily and quickly installed by the car owner himself and remains a permanent part of the car equipment. In operation it is said to be as simple as starting an electric iron or toaster—merely plug into the heater with an extension cord attached to the electric light socket. When not in use, it does not interfere in the slightest with the circulating system.

The Knight Metal Products Co., 259 East Willis Ave., Detroit, Mich., will be glad to give further particulars and trade prices to those writing to it and mentioning the American Garage & Auto Dealer.

### Lock Which Prevents Theft Endorsed by Underwriters.

The other day a man drove his automobile downtown, parked it in front of his office, and went in to work. At lunch time, when he came out, his car was gone. You, Mr. Dealer, can help to protect your customer by advising them to buy a good transmission lock.

A good transmission lock is worth having. The Chas. G. Trosien Co. is manufacturing a lock which it guarantees as a protection against the automobile thief.

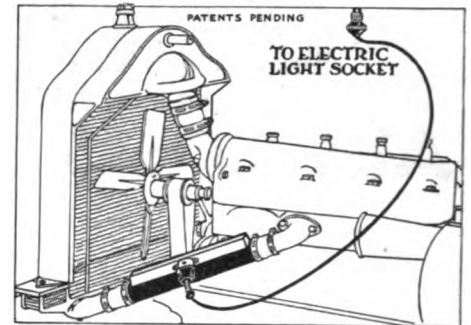
Four styles of locks for different makes of cars are manufactured. Three of these lock with hardened steel balls and the fourth one with two hardened spring plungers.

These locks are endorsed by the Underwriters and consequently reduce insurance 15 per cent. The manufacturers agree to stand back of their guarantee if these locks don't prove satisfactory.

This accessory is of a practical value and should be enthusiastically demanded by all automobile owners. Write for trade price lists and complete information to Charles G. Trosien, Mfr., 108 Franklin Blvd., Pontiac, Mich., mentioning the American Garage & Auto Dealer.

### Insulator from Natural Material Found in Stone and Clay.

The principal weakness of the ordinary sparkplug is the insulator which, as it is usually made of porcelain, is likely to break



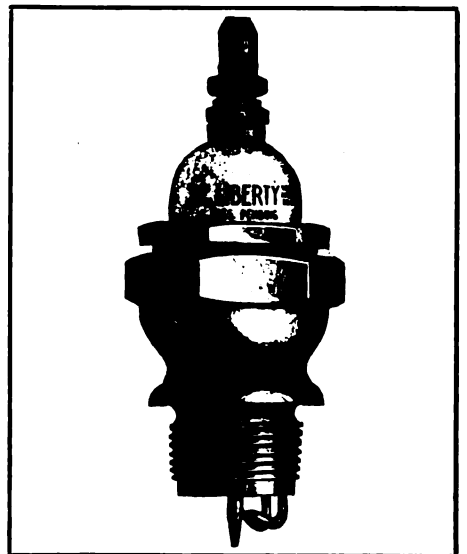
Motor Heater, Simple and Effective.

under the severe service every sparkplug receives.

The insulator used in the "Liberty" plug, manufactured by the Federal Corp., is made of steatite, a natural insulating material which is found in two different forms, stone and clay. The stone form was mined in Germany before the war, the makers say, and sparkplugs with insulators turned from the natural stone were sold in this country before the war cut off the supply.

In the meantime, methods of making insulators from the clay steatite (which is not a German product) were perfected, and it is said that the insulators made from the clay form are actually superior to those made from the stone steatite.

That these insulators withstand an extraordinary amount of abuse without breaking, that they can be heated red hot and dropped into ice water, and can be subjected to the most severe tests, are the claims of the manufacturers of this plug.



Sparkplug Made From Natural Insulator.

The Federal Corp., Westfield, Mass., expects to produce four million of these plugs during 1920. Write for trade prices. Don't fail to mention the American Garage & Auto Dealer when you are writing.



**Hall Motor Co.**SERVICE  
AND  
PARTS

AUTHORIZED

**Ford**

AGENT

THE UNIVERSAL CAR

512-516 W. UTICA ST., COR. BRAYTON  
BUFFALO, N. Y.

BELL TUPPER 4836

August 11, 1919.

The Stenman Electric Valve Grinder Co., Inc.,  
41 Southbridge St.,  
Worcester, Mass.

Gentlemen:-

Replying to your letter of August 9th, would say it affords us much pleasure to send you our check to cover the cost of the Electric Valve Grinder sent to us for trial a short time ago.

We have no hesitation in stating that we have tried three or four other different makes of grinders, and consider yours much superior to any of them. Its smooth, velvety action enables us to make a much nicer job than any other valve grinder we have tried.

HHH/FM

Yours very truly,

HALL MOTOR COMPANY,

Per

*Harry H. Hall*

The moral from the above letter, is that you insist on getting a "Stenman" and accept no other. "As good or better" has not yet been made. Your jobber can supply you—if not—write to —us. Circulars on request.



Made under U. S.  
Patents 876,449  
1,813,490. Others  
pending.

**"Will Pay 300%"**

The Stenman Electric Valve Grinder will pay 300% yearly on the original cost where it is used to grind but one set of valves a week. If used more the returns will be proportionately greater.

**"They Serve Best Who Are Best Equipped To Give Service"**

The Stenman Electric Valve Grinder is the greatest time and labor saving tool that ever went into a repair shop. It is eight times quicker than hand work and does a better job. Thousands are already in use and you can depend on this wide use as a guarantee of its worth. Order one today from your jobber. It will have practically paid for itself before the bill is due.

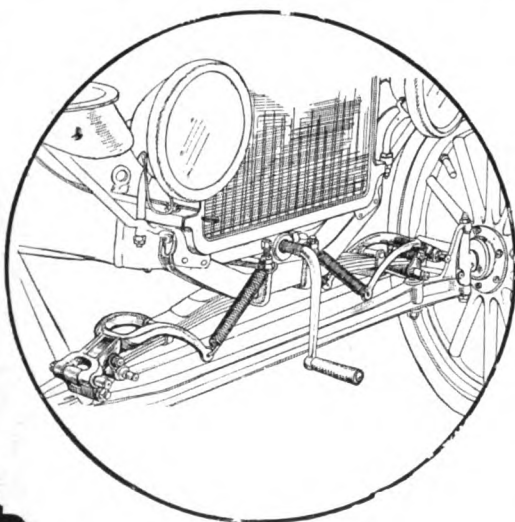
**"They Profit Most Who Serve Best"****Stenman Electric Valve Grinder Co.**

Makers of the Original Electric Valve Grinder

41 Southbridge St.,

Worcester, Mass.

Copyrighted 1919 by Stenman Electric Valve Grinder Co.

**What has "1920" in store for you?**

ARE you going to be satisfied with equalling the accessory business of the previous year, or are you out for a big increase? If you are in the latter class we would like to talk business with you.

Probably no other accessory on the market affords such an all year 'round selling opportunity as shock absorbers for Fords. Among these the W & C's stand alone in both efficiency and popularity.

W & C's are the only shock absorber with bronze bushings—a feature that every Ford owner will appreciate. They sell best because they have actually done what other shock absorbers claimed to do—put comfort into the Ford.

Retail Price still \$10.00 per set of four. Liberal dealers' profits. Write for particulars.

**P. H. WEBBER COMPANY, Hoopeston, Ill.**

Chicago Sales Office:  
WALTER ECKHOUSE  
& CO.  
616 S. Michigan Ave.



**More than 200,000 W & C  
Shock Absorbers are in service**

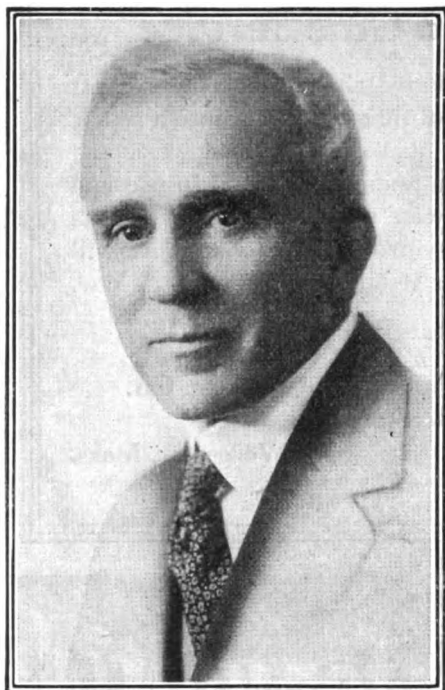
Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# News of Manufacturers and Jobbers

## E. A. Bates Appointed Manager of Booty Carburetor Co.

One of the most prominent figures in the carburetor world, E. A. Bates, has severed his connection with Benecke & Kropf, to accept the management of the company manufacturing the new Booty carburetor.

Mr. Bates states that he is with the



E. A. Bates.

new company because it came after and captured him.

"When I first heard of it as only another carburetor, he says, 'I dismissed it without investigation. But I kept hearing of it and its performance; kept hearing stories that were almost unbelievable—stories that meant just one thing if they were true, and that was the solution of the increasing difficult carburetion problems attending the low grade of gas.

"Upon investigation I found the stories had not been strong enough. I found the Booty a carburetor based on an entirely new principle—so simple that the user can understand it—with one single control from the dash, with not one single adjustment on the carburetor itself."

## New Developments in Clutches and Universal Joints.

Simple and strong in its construction and embodying all of the best points worked out by automotive engineers during the war, are the claims of Merchant & Evans Co. for the oil-tight universal joint it is now offering to the trade.

The working parts consist of two hard-

ened and accurately ground pins, the four ends of which are inserted in four hardened and ground bushings, which are driven into two tough steel drop forgings, a block being inserted between the yokes of these forgings for centering and supporting the pins.

Very large bearing surfaces have been designed, so that the pressures per square inch are as small as possible. They are made in four sizes to fit all conditions of work.

Another important development of the company's products is its new dry-disk clutch, which is of the unit power-plant type and guaranteed to go into any open fly-wheel that motor manufacturers supply; it is constructed to fit standard types of S. A. E. bell housings.

A very light main spring pressure is multiplied by three levers and thereby produces strong spring pressure on the disks. The friction surfaces are very large, which adds to the life of the clutch. Adjustments, the maker says, are simple and easily understood, and are made by a unique arrangement of steps on the cover plate.

More detailed information and trade prices will be given to those writing the Merchant & Evans Co., 2013-2035 Washington Ave., Philadelphia, mentioning the American Garage & Auto Dealer.

## Buenos Aires Parade Shows Preference for National Wire Wheels.

Last month there was a parade in Buenos Aires in which 134 Ford cars participated. As they swung past some of the architectural grandeur of this newest metropolis,

a photographer caught the modern spirit of the owners whose preference for National wire wheels is evidenced.

It is said, that Jose A. Aedo, representative of the National Wire Wheel Works in the Argentine, is doing a wonderful business at this time. Invasion by Yankee industries has not met with general success, so the path-finding by National wire wheels appears to be a forerunner for other desirable accessories.

## The 1920 Directory of Burd Piston Rings Recently Published.

A very complete piston ring directory has just been issued by the Burd High Compression Ring Co. It is a book of 112 pages, 4 ins. by 6 3/4 ins. in size, with an attractive cover design and is substantially bound.

Over 600 sizes and oversizes of the Burd piston rings are listed in the new directory, a size for practically every make and model of gasolene engine.

Complete piston-ring specifications for over 1,500 models of automobiles are given and the correct size of piston rings required for nearly every automobile, truck, tractor, airplane, hydroplane, motor boat and motor cycle engine, can easily be found by referring to the index, which makes this new book one of the most convenient and practical that has yet been published.

In addition to the tabulation of sizes, the directory contains complete instructions for the installation of piston rings, information regarding oversizes, and scores of helpful hints and suggestions about motor



Parade in Buenos Aires Shows Preference for National Wire Wheels.

# SAVE YOUR GAS



## *The* **EWALD** **FOOT ACCELERATOR** **FOR FORD CARS**

**S**AVES gas because it eliminates unnecessary racing of your engine. The moment you take your foot off the accelerator to apply your brakes, the motor slows down instantly. Puts hundreds of miles of extra service into your whole car by cutting out those harmful hammering vibrations that come from running your motor at high speed without load. Leaves your hands free to operate the wheel, brakes and horn, and makes safety first more sure.

With an Ewald Foot Accelerator on your Ford car you can set the speed of your motor to a point where it is barely turning over and get away in a flash.

*A necessity in the city. A great convenience in the country. Guaranteed for the life of your car.*

**PRICE, 75 Cents**

MANUFACTURERS  
**ROMORT MFG. CO.**  
OAKFIELD, WIS.

SALES DEPT.  
**THE ZINKE CO.**  
1323 Michigan Ave., Chicago, Ill.

# You get a good share of the profit.

The **MODEL "N" MARVEL CARBURETER** improves car performance, and increases mileage from 22 to 25 miles per gallon.

No changes are necessary to install it. Fits right in place of regular installation.

## **MARVEL CARBURETER**

*Designed especially for FORDS*

sold on 30 days' trial, with money back if not satisfactory.

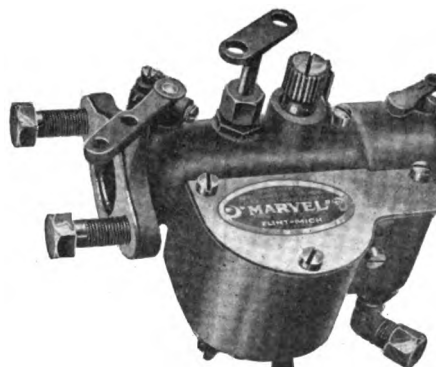
**Price F. O. B. Factory \$10.00**

**MODEL "E" CARBURETERS** are standard on Buick, Oakland, Nash, Scripps Booth, GMC, Wilson and all  $\frac{3}{4}$ -ton U. S. A. Government Trucks.

**MODEL "E" Carbureters** greatly improve Maxwell, Overland, and Studebaker cars.

**DEALERS--If interested, write for further information**

**MARVEL CARBURETER COMPANY**  
FLINT, MICHIGAN, U. S. A.



troubles, elimination of carbon, U. S. official millimeters conversion table, decimal equivalents of fractions and other data very valuable to the repairman.

A copy of this helpful book will be mailed on request to any one writing the Burd High Compression Ring Co., Rockford, Ill., mentioning the American Garage & Auto Dealer.

### New Method of Weaving in White Stripe Lining for Fords.

Recent advertising of White Stripe transmission lining for Ford cars has called



Looms for Weaving White Stripe Lining.

attention to a new method of weaving used in making this lining.

There are two separate sets of threads. One set constitutes a framework running crosswise and lengthwise. Over this is a separate set of wearing threads, which protect the framework of binding threads completely, so White Stripe will not come to pieces as soon as a surface thread is worn through. On the contrary, the manufacturers state, when the surface threads are entirely worn away, there still remains a complete webbing, composed of cross and lengthwise binding threads.

Special looms had to be constructed to work out this idea. The wearing threads are of fine quality hose-cord yarn, with 21-ply filler in the cross strands, giving great strength, and preventing side spread. Every strand of White Stripe is said to be filled with a treatment that keeps the fabric soft and protects it from the hardening effect of hot oil and friction.

The Advance Auto Accessories Corp., 56 E. Randolph St., Chicago, Ill., is manufacturing the product and producing it at a rate of 100,000 feet a week or over 5,000,000 feet a year.

### Pressed-Steel to Supersede Wood and Wire Wheels in Europe.

Pressed-steel wheels will supersede wood and wire wheels in Europe before very long, in the opinion of Benjamin Briscoe, of Briscoe & Stahl, Detroit, designers of and purchasers for cars to be manufactured in France from materials secured in America, and in part from material of French manufacture. Mr. Briscoe recently returned from the Paris automobile show and his reports to Rodolphe Stahl, his partner, lead Mr. Stahl to make the prediction that pressed-steel wheels will ultimately be seen on American cars as generally as are wire wheels and wood wheels today.

"I can see it coming," said Mr. Stahl. "In the old days we felt that wood wheels were the only thing, because all makers used them. Then came the wire wheel, and at the outset there were many who predicted that they would not be popular. But they are. Now comes the pressed-steel wheel, and Mr. Briscoe says that makers abroad manufacture them there at a lower figure than is possible in America."

"Pressed-steel wheels will be generally used abroad within a year, and will grow in popularity in America as the days go by. Wood is growing scarcer and scarcer for wheel making, and manufacturers must necessarily look for other material."

### Howard Auto Headlight Deflector Ready for Distribution.

After six months spent in experimenting with many different and varied designs of headlights, after 14 years of night driving, during which he was the victim of two accidents caused by "headlight blindness," Howard C. Carter invented the Howard Auto Headlight Deflector.

The difficulty which had to be overcome in making a deflector was the reflex act of the human eye, alternately expanding and contracting with the various light intensities.

It is said that this new deflector solves the headlight problem satisfactorily, is marvelously simple, and has now reached quantity production.

### New and Practical Fenders for Ford Tractors Placed on Market.

By making a practical fender for Fordson tractors, the Corcoran Mfg. Co. has responded to a great need.

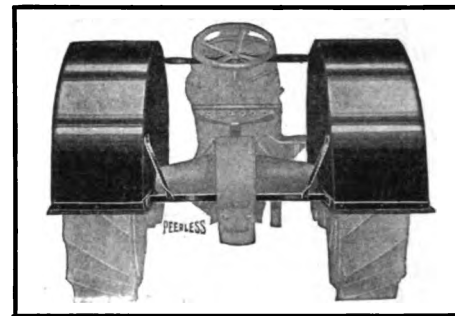
It is an established fact that the tractor is rapidly coming into "its own," and within the past two years has become a necessity to the progressive farmer on the modern farm operating on efficient and up-to-the-minute methods.

"The demand for a general utility, light-weight tractor has been enormous," says the Corcoran company, and this demand has been partly answered by the Fordson tractor.

"These tractors, however, are not equipped with fenders when they are turned out at the factory, and the demand

for a fender made especially for them is, therefore, as great as the demand for the tractor itself."

The fender made by the Corcoran company was designed particularly to meet



Practical Fender for Ford Tractor.

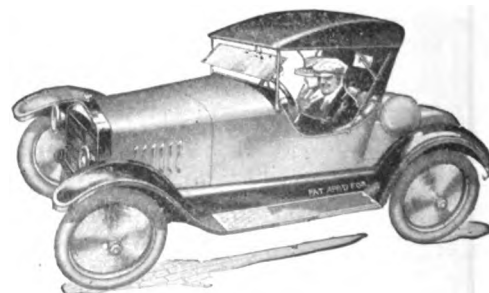
this demand and is made of very heavy gage steel, finished in two coats of black enamel baked on, and furnished with the necessary irons and bolts to hold them rigid to the tractor, and they are essential for the protection of both driver and engine, and add greatly to the appearance of the tractor.

They are the latest addition to the "Peerless" line of commercial fenders, especially for the new Ford truck equipped with 32 x 4 1/2 pneumatic tires. These truck fenders are also made of heavy gage steel, finished with two coats of black enamel baked on. Two extra heavy, wrought-iron brackets, bolts and washers, are furnished with each fender.

Write to the Corcoran Mfg. Co., Cincinnati, Ohio, for trade prices and further information, mentioning the American Garage & Auto Dealer.

### Attractive and Comfortable Roadster Bodies Designed for Fords.

Special bodies for Fords that are meeting with high approval in the trade are being manufactured by the New England Mills Co. Torpedo bodies, big, comfortable and up-to-the minute in style, roadster bodies, the classiest and latest, run-about bodies that are smart and artistic, four-passenger and racer models rakish in line, and at the same time comfortable in



Special Body Design for Fords.

their furnishings, are among those produced.

The frames, the makers state, are well made of selected wood. The construction is of cold-rolled, automobile anti-rust steel.



# End Your Tire Trouble Forever



**I**T brings new happiness and releases you from the horrors of expected tire trouble, making your car more delightful. Think of the joy of riding along without the eternal fear of a puncture or blow-out. Think of getting 10,000 to 20,000 miles out of every tire—no vulcanizing, no patching, no repairing of any kind, doing away with your inner-tube forever by installing in your tires this wonderful and economical

## National Rubber Tirefiller

This marvelous substitute for air is being used by thousands and thousands of satisfied car owners throughout the United States and many foreign countries. We have been manufacturing and selling it for more than seven years; selling last year more than 35,000 sets.

National Rubber Tirefiller is made of the best grade of rubber, cut in small particles, treated, molded and vulcanized by our special steam process, in sizes to fit all standard makes of tires. It is laid in your tires and not melted and poured in. It can be transferred from one tire to another. It will not freeze, melt or harden—fully guaranteed against deterioration in any form, or being affected by atmospheric conditions.

**Don't let prejudice stand in your way. Good business judgment demands that you at least make a careful investigation. Let us send you full information, sample and prices.**

**DEALERS—We have a fine proposition for you.**

**National Rubber Filler Company**  
210 College Street Midlothian, Texas

# OPLEX

## The Signs With the Raised White Letters

**O**PLEX Electric Signs have raised letters of snow-white glass, standing out from a dark background.

This means they are perfect day signs as well as electric night signs.

They are many standard Oplex designs to suit the needs of the sales agency and the garage. Any trademark can be perfectly reproduced in the raised Oplex characters.

Won't you give us some idea of your sign needs so we can send you a sketch showing how your Oplex sign will look.

**THE FLEXLUME SIGN CO.**  
ELECTRIC ADVERTISING

Niagara St. and Potomac Ave., Buffalo, N.Y.

Pacific Coast Distributors  
Electric Products Corp.  
Los Angeles, Cal.

Canadian Distributors  
The Flexlume Sign Co., Ltd.  
Toronto, Ont.



The body and hood are designed to fit a 1917, 1918 or 1919 Ford radiator. Only a few of the special features are mentioned here.

Particularly attractive is the "Fidelity" club roadster body for all model T Fords. It is well-designed, beautifully curved over the cowl, around seat and rear, and nicely upholstered. It is, the makers claim, one of the most stylish and most comfortable bodies ever made for the Ford.

The "Little Salesman," a dealer's confidential, illustrated, net price list on automobile and truck supplies, is now ready for the trade. Copies will be sent to those writing the New England Mills Co., 1219-1221 Michigan Ave., Chicago, mentioning the American Garage & Auto Dealer.

### Norma Co. Consolidates Offices and Factory at New Address.

On December 10, the Norma Co. of America, manufacturer of Norma precision bearings, moved its factory from Bronx, New York City, to Anable Ave., Long Island City, N. Y., where a modern four-story reinforced-concrete building has been acquired.

### Vulcan Spring Expects Doubled Business in 1920.

Representative members of the sales organization of the Jenkins Vulcan Spring Co. convened at the factory, Richmond, Ind., from December 27 to December 30, for a discussion of 1920 plans.

"The convention was a tremendous success from every possible standpoint," said T. B. Jenkins, president.

"Advertising came in for protracted discussion, and all of us were tremendously in favor of continuing our established policy of liberal advertising, both in the trade papers and in general periodicals of national circulation.

"Our plans have been laid for doubling our sales for 1920, over 1919, and it was the unanimous opinion of all salesmen and branch managers present that we would put this campaign over with a wallop."

### L. M. Lloyd Elected President of E. A. Cassidy Co.

The Edw. A. Cassidy Co., announces the election of L. M. Lloyd as president, to fill the vacancy left last November by the death of E. A. Cassidy.

Mr. Lloyd, who is a Yale graduate, first entered the publicity field, and later became connected with H. W. Johns-Manville Co., in a publicity capacity. In 1916 he joined the E. A. Cassidy Co. as advertising manager and later became vice-president, advertising and sales manager.

The officers elected at the annual meeting are: L. M. Lloyd, president, Gregory Hymn, vice-president, G. B. Gosman, secretary and treasurer.

The E. A. Cassidy Co., acts as sales agents for the Corning Glass Works, Acheson Graphite Co., G. Piel Co., F. W. Mann Co., Troy Foundry and Machine Co., Arthur S. Brown Mfg. Co., and the Sterling Varnish Co.

### Large Air Compressor "The Rayfield Champion" Announced.

A new large-capacity air compressor designed to meet the requirements of users of large volumes of air at high pressures has just been announced.

This new machine, which will be called the "Rayfield Champion," has a capacity of 10 cu. ft. per minute at 230 r. p. m. and a working pressure of 300 lbs. per sq. in. It is a two-stage compressor, air-cooled, and is automatically controlled as are the other Champion machines. The low pressure cylinder has a bore of 4 3/8 inches and the high pressure cylinder one of 2 3/8 inches; the stroke is five inches.

It is driven by an electric motor, is mounted in a unit with tank and without tank, and has the exclusive features which are embodied in the design of the Champion Special.

This new machine will appeal to all garage-owners because of its reserve capacity. It is designed to meet all the requirements of a garage; it will inflate large truck pneumatic tires; it will enable sev-

eral ordinary tires to be inflated at one time, and besides may be used for driving air machinery, drills, riveters, etc.

### Paragraphs.

THE MOHAWK RUBBER CO., Akron, Ohio, has still further increased its distribution facilities on the Pacific Coast by opening a new branch house in Los Angeles.

THE HOWARD AUTO HEADLIGHT DEFLECTOR CO., Detroit, Mich., has appointed the Berg-Kinzel Sales Co., 660 Market St., San Francisco, Cal., as distributors for California and Nevada.

THE NEW ENGLAND MILLS CO., Chicago, Ill., has left its old location at 1219-1221 S. Michigan avenue, and is combining its showrooms and offices with its large warehouse at 1027-1033 W. Van Buren street, Chicago.

THE DUPLEX TRUCK CO., Lansing, Mich., advises that it has just completed arrangements whereby the Lawrence Motor Sales Corp., New York, will handle the complete Duplex line of motor trucks in New York and a considerable surrounding territory.

THE FAIRBANKS CO., New York City, has promoted A. G. McMillan, formerly eastern sales manager of the automobile service station equipment division of the company, to general sales manager of the division. Mr. McMillan's headquarters will be in New York.

THE CURTIS PNEUMATIC MACHINERY CO. will have a double-space exhibit at the Chicago Show, where it will display all representative sizes and styles of "Curtis" compressors from the little private garage set, or style "Y," to the large three horsepower No. 5 "Curtis" compressor.

THE NORTHWESTERN CHEMICAL CO., of Marietta, Ohio, manufacturer of Norwesco "Chemically Correct" utilities, announces the promotion of L. D. Speed, its representative in the Central-Western states, to the position of central sales supervisor. Mr. Speed will have charge of the entire central territory with a large sales organization under his direction.



Model 502 Test Set  
Price \$25.00 prepaid to you

We have openings for a number of live dealers.  
Write for our free catalogue and dealer's proposition today.

**H. E. PHILLIPS & CO., Union City, Ind.**  
(Formerly Phillips Engineering Co. and Auto Electric Systems Publishing Co., Dayton, Ohio.)

### We Manufacture

electric testing, charging and magnetizing instruments for use in garages and service stations.

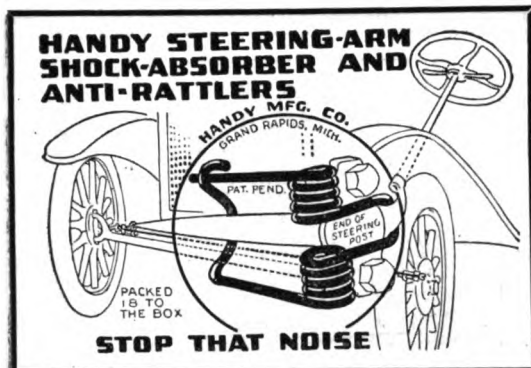
We publish the world's best book on motor car electric systems, showing circuit and wiring diagrams back to 1910. This book also contains instruction on elementary electricity, electric testing, etc., etc. Price delivered to you \$2.50.

## Buy NOW!

Waiting for lower prices before ordering that equipment you need or stocking these accessories your customers want is like sitting on a fence and waiting for your rich uncle to die. You lose more than you can possibly gain by a drop in prices.

To make 1919 your best year buy your requirements NOW.

**AMERICAN GARAGE  
& AUTO DEALER**



**A big worth while profit to the dealer**  
**Attractive Counter Display Boxes**

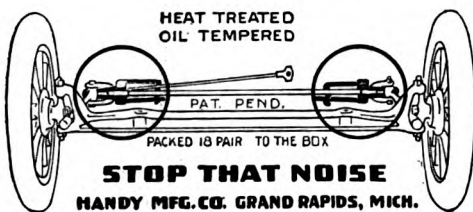
*Most Jobbers Have Them*

Tie Rod, Brake Rod, Steering Arm, Shock Absorber,  
 Big Brake, Overlaid Gear Shift Throttle and Gas.

A complete  
 set for  
 every  
 model  
 car.

**HANDY TIE-ROD  
 ANTI-RATTLERS**

**FITS 98% OF CARS**



Write  
 for par-  
 ticulars

**"No, we don't junk old tires"**



**We send them to  
 Leo M<sup>c</sup> Daniel.**

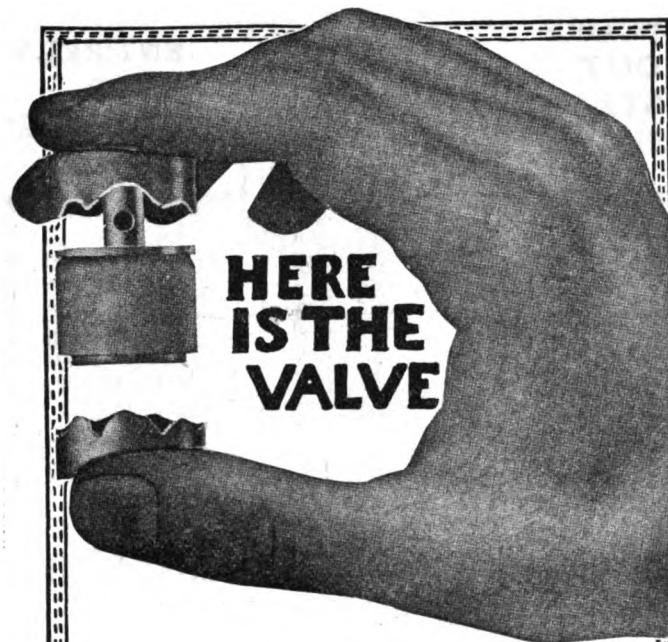
If you are only getting junk prices for the old tires that accumulate in your shop you are missing a big opportunity. Send them to us. We remake them by a process that gives them at least 5,000 more miles—no matter if they are punctured, rim-cut, sand blistered or blown out. You can sell these remade tires at a handsome profit.

Write today for details.

**Leo McDaniel Rubber Co.**

804 Commercial Ave., CAIRO, ILL.

PROFITS  
 —LEO  
 —DANIEL  
 RUBBER



net the Dealer and Job-  
 ber more profits, because  
 more of them are sold.

**Over  
 2,000,000**

satisfied users of Rose  
 Tire Pumps is the best  
 evidence of correct de-  
 sign.

**The Patent Valve**

—not found in other  
 pumps, is responsible for  
 the popularity of the  
 Rose.

**Other Features**

in keeping with Rose quality—  
 Steel Barrel that will not jam  
 or dent. Five-ply Hose, giv-  
 ing extraordinary service.  
 Steel Base, will not break.  
 Stirrup of steel, folding along-  
 side the barrel. Handle de-  
 taches by spinning backward.

Most Jobbers and Dealers handle  
 the Rose line of Tire Pumps, Grease  
 Guns, Grease Buckets, etc.

*Manufactured and Guaranteed  
 by*

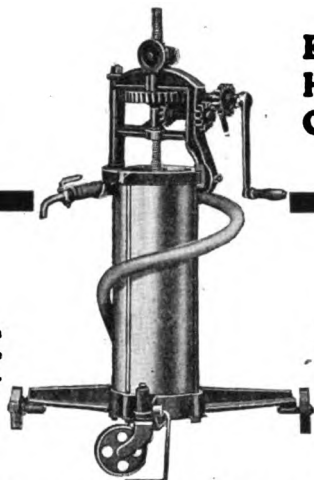
**J. H. Haney & Co.**

Hastings, Nebr.

**POURS  
OUT  
STEADY  
PROFITS**

**ENTIRELY  
HAND  
OPERATED**

Model K holds  
20 lbs. grease  
or 2½ gals. oil.



Model N holds  
56 lbs. grease  
or 7 gals. oil.

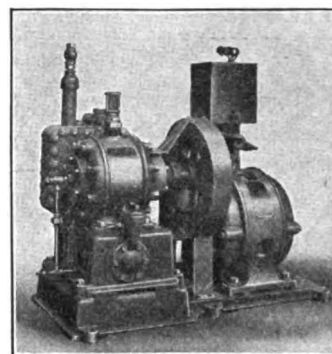
## Ekern "Model N" Portable Garage Grease Gun

Undoubtedly there is scarcely any garage equipment which is absolutely indispensable; yet there are a few products which come mighty close to being necessary. Among these, our "MODEL K" and "MODEL N" PORTABLE GARAGE GREASE GUNS are very prominent.

Address us today for full particulars.

*H. G. Pavo Co.*

**1412-14 South Michigan Blvd.  
CHICAGO, ILL.**



## Jackson Rotary Compressors

Weigh less than half of other types but will satisfy the most exacting. Note these features and write for full particulars.

Slow Speed, No Vibration, Positive Displacement, Easy to Install, Simple to Operate, Perfect Balance, Quiet in Operation. Especially adapted to garage purposes.

**JACKSON  
COMPRESSOR  
COMPANY**



231 S. Cherokee St.  
Denver  
Colorado  
U. S. A.

**GARAGE**



**A. Schrader's Son,  
Brooklyn N.Y.**

Kindly hurry that order for Inflating Valves. We had no trouble with our Free Air Station as long as we used this Valve but when we had to put in another make, — the fun began.

EXTRACT FROM ACTUAL LETTER RECEIVED.

## Pondelick Brothers

will pay **\$100**

if they fail to duplicate any part of any make of automobile or truck foreign or domestic, submitted to them. That sum will be paid to the person sending the order.

Parts of any machine can be duplicated in 1 to 3 days' notice. All welding is done at their risk. Do not compare this work or welding with that of others. If you have a broken part or parts that others cannot weld or repair, send them to Pondelick's. They increase the durability of many parts—even where the manufacturers fail.



Supply your customers with "Pondelick's" anti-leak piston rings, and you insure them against engine trouble.

They have the largest and best equipped plants in the United States for the repair or reproduction of automobile parts.

Cylinder regrinding, new piston, special casting, heat treated, Pondelick's self-adjusting, anti-leak piston rings, new wrist pin, hardened and ground, bushing made of genuine bronze, including fitting and assembling of connecting rod to piston for \$15.00.

Reputation, not competition, determines our policies. Visit our plants and be convinced. Ask anywhere or anybody about our work.

General Factory, 5100 to 5112 West 16th St.  
Main Office, Leavitt St. and Jackson Blvd.

**Pondelick Brothers, CHICAGO ILLINOIS**

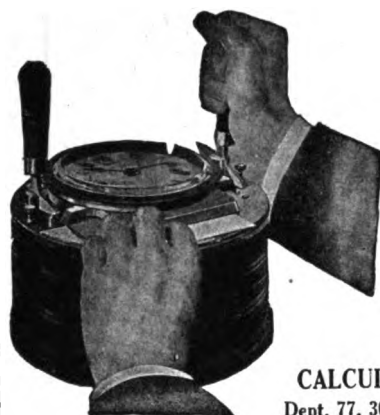


## Don't lose good customers through disputes over repair bills!

How often a car owner "kicks" over a repair bill that you know is fair and equitable. Unless you have some tangible evidence of the correctness of the bill to show the customer you may lose him.



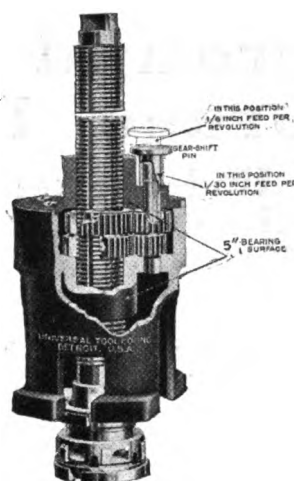
### End those disputes by installing a **CALCULAGRAPH**



It records and prints the elapsed time on repair jobs. This time, plus materials used gives you a correct basis for your bills. The records it furnishes settle all disputes and enable you to retain the good will and patronage of the most confirmed "kickers."

Write for Particulars.

**CALCULAGRAPH COMPANY**  
Dept. 77, 30 Church St., New York City



## Tests Have Proved It

The Universal Cylinder Reboring Tool has been tested by the manufacturers of America's leading cars.

Today, knowing that it is a perfected machine, they endorse, recommend and use it.

See current issue Auto Trade Directory and Chilton's Directory for list of jobbers carrying stock. Write for Catalog.



UTCO PRODUCTS

**The  
Universal Tool Company, Inc.**  
435 Woodward Avenue Detroit, U.S.A.

*Manufacturers Universal Cylinder Reboring Tools for all Automobile Motors and Main Bearing Replacement Equipment for Fords and Fordsons*

# "AM-PĒ-CO" PRODUCTS

Sell readily because their superiority  
is well known to the Motoring Public

## AM-PĒ-CO" PISTONS for FORDS

Make the Ford motor flexible and smooth running—provide greater power and increased speed. "AM-PĒ-CO" Pistons are uniform in weight, mechanically accurate and true to measurements.

**MARSHALLTOWN CUTOUTS** are made to satisfy the most exacting demands. Valve has beveled knife edge that insures tight closing at all times. The longer used the tighter the valve becomes.

We also make the famous "AM-PĒ-CO" WHEEL PULLERS and BRAKE SHOES, both one- and two-piece. If your jobber does not handle "AM-PĒ-CO" Products, write us direct.

F. H. & S. COMPANY, 624 So. Michigan Blvd., Chicago

General Selling Agent for

**American  
Machine  
Products  
Co.**  
Marshall-  
town,  
Iowa



# GANSCHOW GEARS

for service and reliability

The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

Write today and feel free to consult our Engineering Department.

**Wm. Ganschow Company**  
1002 Washington Boulevard  
Chicago, Illinois



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Underground Gasoline Storage Tanks

Built to Underwriters' Specifications

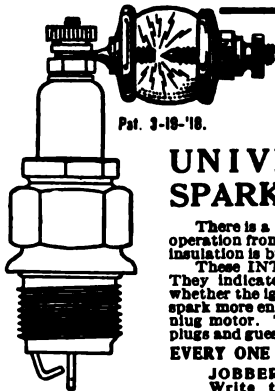
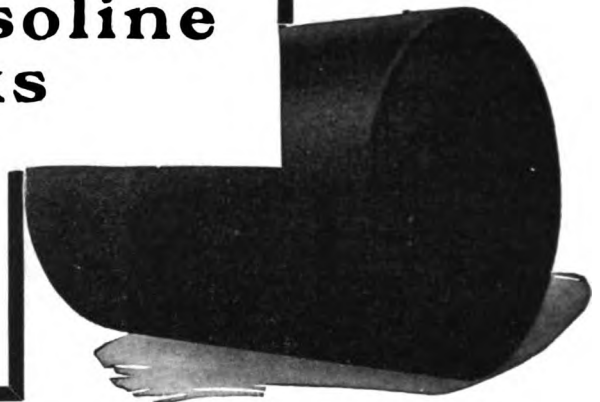
Sold at "attractive" prices

Write for quotations to

## DINES & FOUTCH

301-302 Unity Building

SPRINGFIELD, ILL.



Pat. 3-18-'18.

### Spark Plug Troubles Are Rare Occurrences

on the car equipped with

### UNIVERSAL or MARVEL SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon. These INTENSIFIERS will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM

JOBBER and DEALERS—Your profit is liberal. Write today for our attractive proposition.

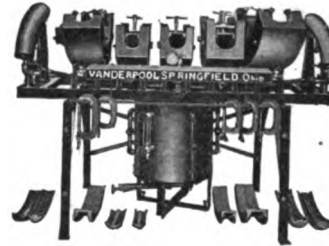
UNIVERSAL MFG. & SALES CO.

550 W. Harrison Street

CHICAGO, ILL.

### EARN \$100.00 A DAY REPAIRING AND RETREADING TIRES

Business good and growing fast. Wonderful opportunity to get into a most profitable business. Hundreds of cars. Hundreds of customers. Our Free Tire REPAIRING MANUAL gives



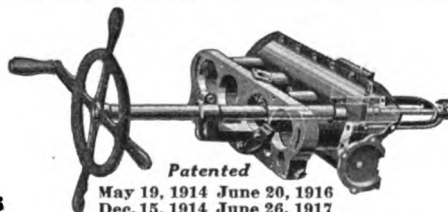
full particulars and shows how to do the most satisfactory work. Write today. Why save your life away for others when your own name can go across the door and you be the proprietor and have others work for you? Vanderpool makes you successful and independent for life. Write today.

In answering address Dept G-20

Wm. Vanderpool Co., Springfield, Ohio

### REPAIRMEN — LISTEN!

The Heiser Improved Cylinder Reboring Tool for Ford Motors



Patented  
May 19, 1914 June 20, 1916  
Dec. 15, 1914 June 26, 1917

is the only Reboring Tool in the world that is self sharpening. It is the only Tool except expensive grinders that will not leave the finished cylinder slightly tapered toward the bottom. It is the only Tool that rebore between centers—this insures a finished cylinder, square with the crankshaft, round, straight and true. It is adjustable, and the only Tool that will rebore different sizes without losing the adjustment.

The best mechanic in the world can't build reputation with proper TOOLS and EQUIPMENT. The HEISER IMPROVED CYLINDER REBORING TOOL makes good shops out of poor ones and better shops out of good ones.

Write today for full particulars.

Heiser Special Tool Co., 115 Rogers Bldg., Kingston, Mo.

### GRAHAM SOCKET WRENCHES

Are turned from the best Solid Bar Stock and are Heat Treated. For

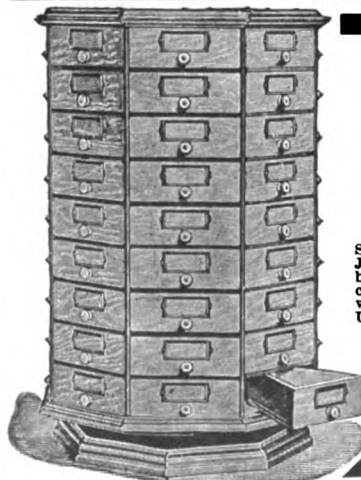
### STRENGTH and RELIABILITY

They are unexcelled. Ask for dealer's discount.

Price  
\$1.50



Graham Roller Bearing Co., Coudersport, Pa.



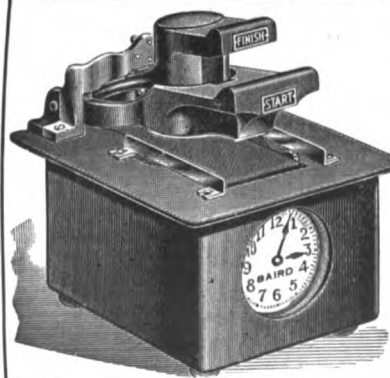
### Keep your supplies in revolving cabinets like these

Systematic! Conveniently Accessible! Just like "rolling off a log" to look up bolts, screws, etc., with this revolving cabinet. Everything at your finger tips, with nothing to burden your memory. Used by leading garages of this country.

Buy today from your jobber. Catalogue on request.

American Bolt & Screw Case Co.  
DAYTON, OHIO

### Put your repair charges on a profitable basis with



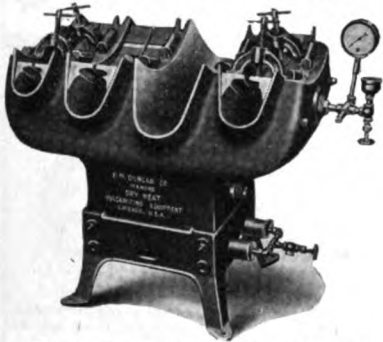
### BAIRD TIMING DEVICES

Keep a check on your employees' time and learn exactly what each job costs. Automatic supervision turns losses into profits.

Prices moderate. Write today for booklet.

Baird Equipment Co.  
324 W. Ohio St., Chicago  
Phone Superior 2071

## Duncan Equipment Marks a New Era in Vulcanizing



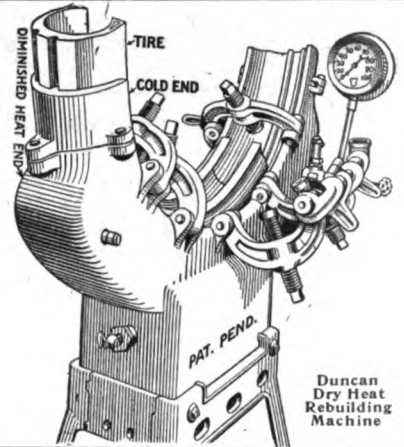
Duncan Adjustable Cavity Sectional Mould

The Duncan Dry Heat Rebuilding Machine will rebuild a tire with sides and laps perfect in construction and finish—comparable with the single cure factory mould.

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Duncan Dry Heat Rebuilding Machine



## Wrecked!

When you get that call, be prepared to go to the rescue with a

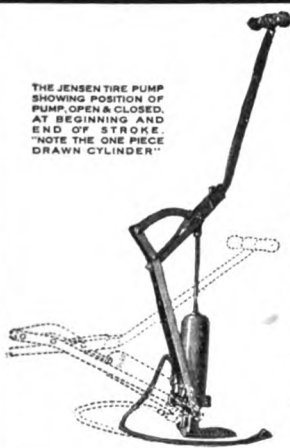
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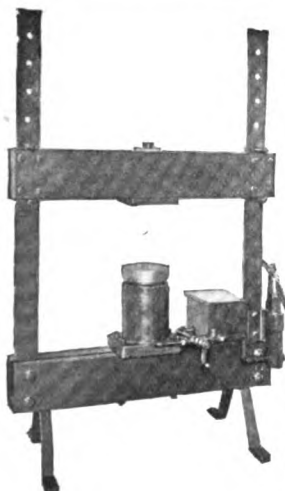
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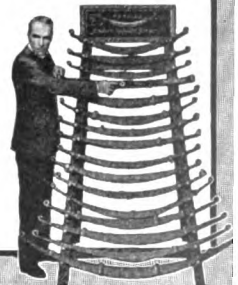
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This display rack FREE with first order.

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Factory  
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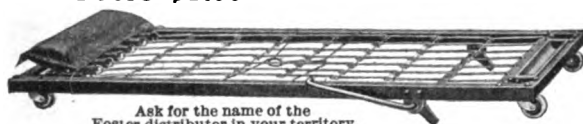
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General Utility Co., 1333 Ogden St., Philadelphia.  
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Utility Sales Corp., 808 New Stock Exchange Bldg., Philadelphia.

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The Graham Roller Bearing Co., Coudersport, Pa.  
Sawyer Sales Co., 50 Terminal Bldg., Lincoln, Neb.

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furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

Made only by

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GARDEN CITY SPRING WORKS  
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Saves Real Money on Tires and Upkeep Cost

With the Burgess "Triple Duty" Rebound Check and Shock Absorber you get three shock absorbers in one. The big, heavy duty cylindrical spring takes up all the big jolts and jars. The heavy elastic rubber cup built in the top of the cylindrical spring completely absorbs the smaller and more rapid vibrations, and the strong and sturdy arm removes every vestige of rebound.

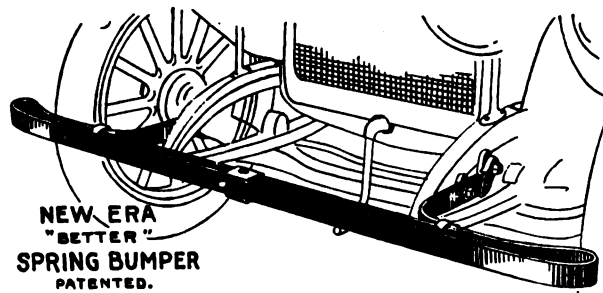


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"Better" Spring Bumpers Are More Resilient  
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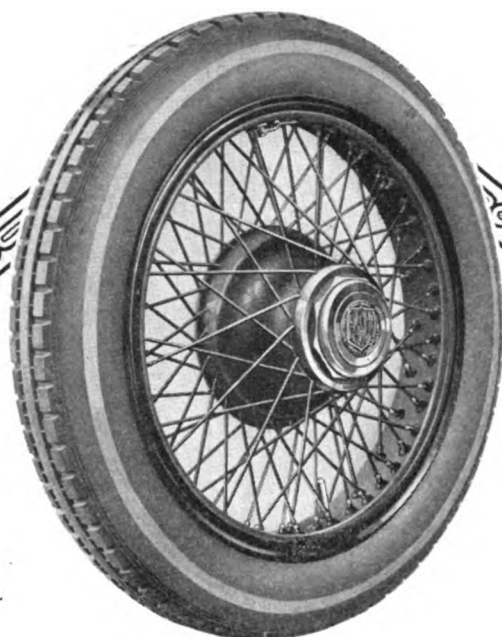
The popular priced "Better" Spring Bumper, as name implies, is in every sense of the word, "A Preferred Choice."

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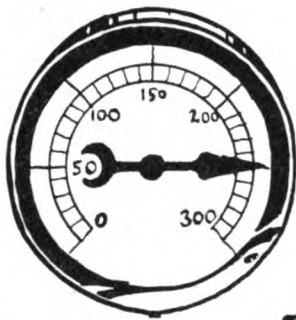
NATIONAL WIRE WHEEL WORKS, *Inc.*

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*Factory:* HAGERSTOWN, MD.

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The big truck tires that are daily becoming more numerous on our highways, have inaugurated a new standard of air compressor service. Garages and service stations must be equipped to furnish air at from 150-250 pounds pressure.

## CHAMPION AIR COMPRESSORS

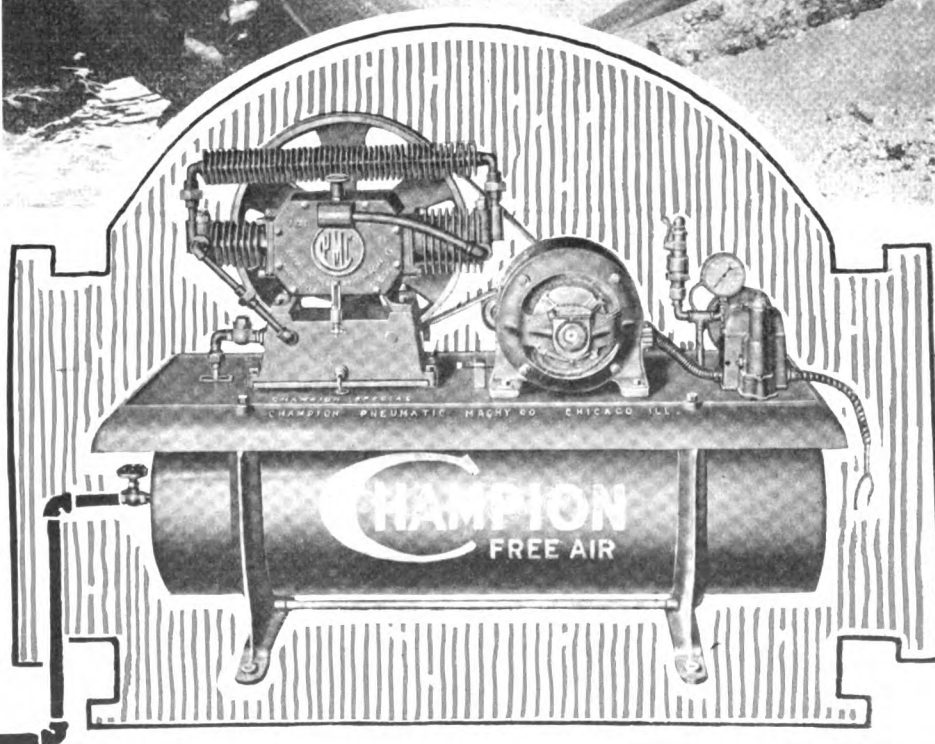
are made to fully meet these new requirements of air service. The tank furnished with the Champion Special Automatic Air Unit is tested for 250 lbs. working pressure, assuring ample power for inflating the largest truck tires.

Champion Air Compressors are ready for prompt delivery. Write today for full information and prices.



**Champion Pneumatic  
Machinery Co.**

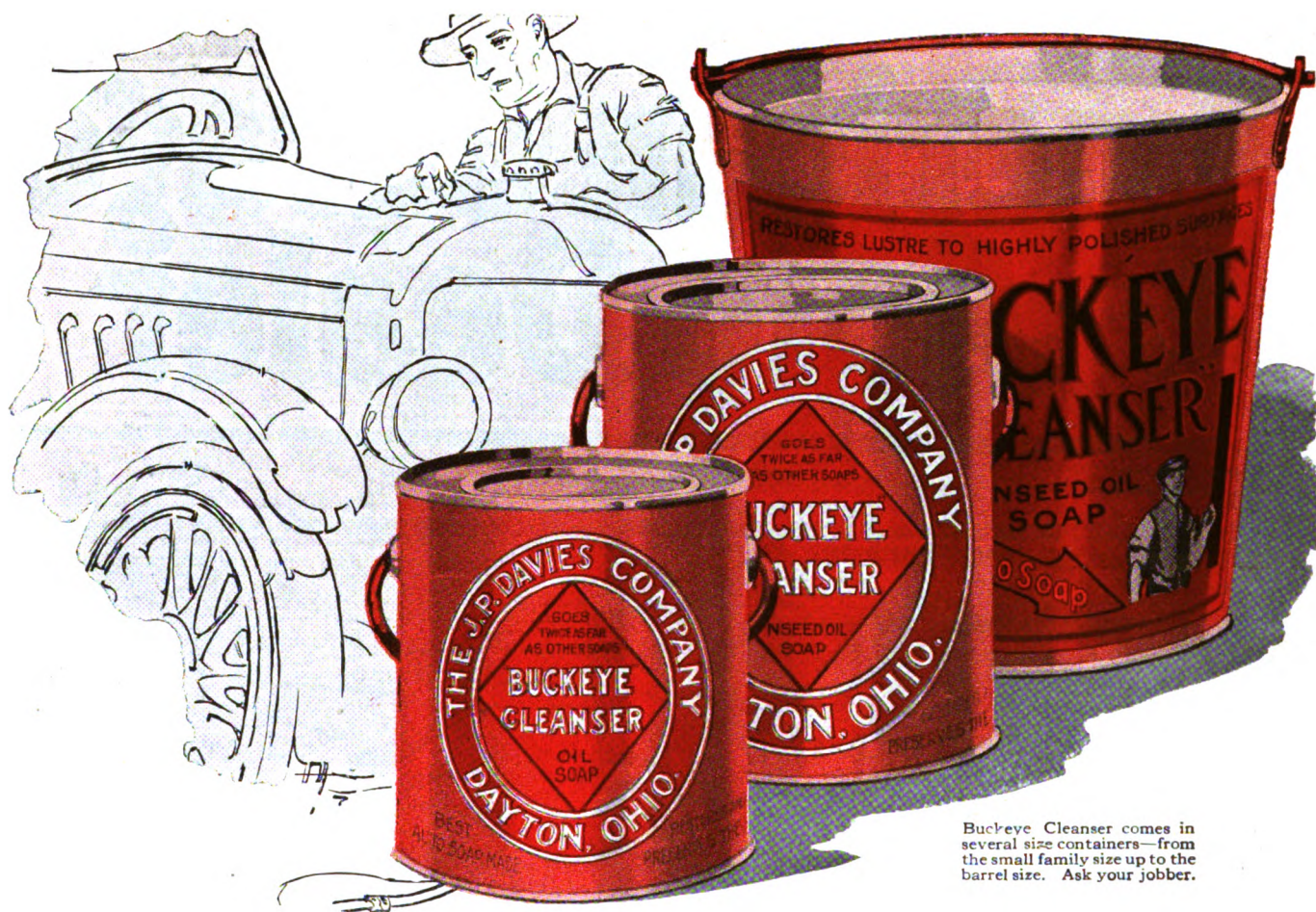
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Buckeye Cleanser comes in several size containers—from the small family size up to the barrel size. Ask your jobber.

## Keep the Auto Bright and Shiny

An auto that is spic and span—bright and shiny—is a real asset to the owner.

Furthermore, his pride prompts him to keep his car looking its best all the time.

The best way to keep it looking like new is to have it cleaned and polished with

## BUCKEYE CLEANSER

A soap that is specifically made for delicate and highly polished surfaces—no alkali or grit or other substance that dulls the lustre or brings the checks and cracks.

You render a real service to your customers when you recommend Buckeye Cleanser. Leading jobbers have it in stock. Progressive dealers sell it.

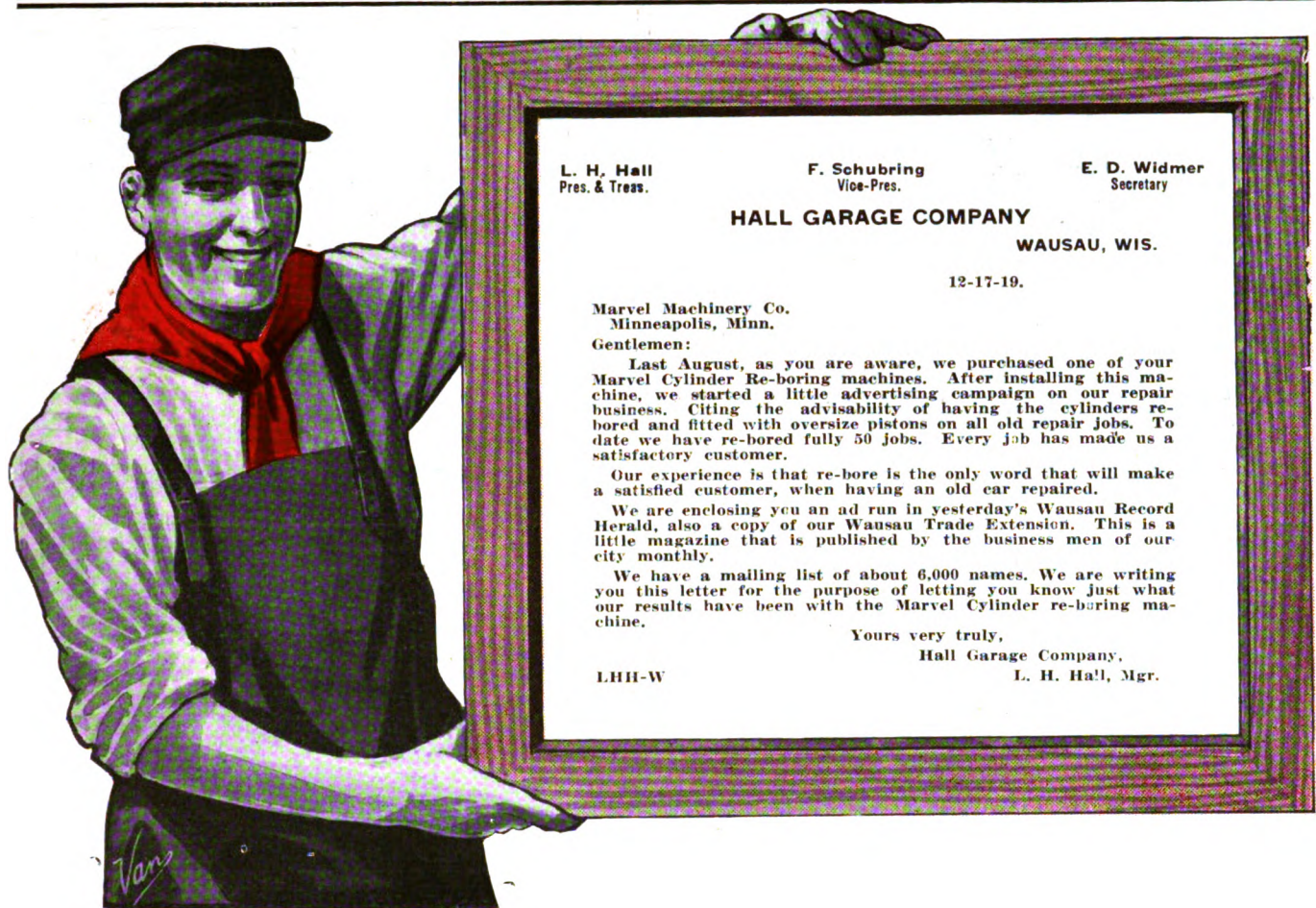
THE DAVIES-YOUNG SOAP COMPANY  
DAYTON, OHIO

# BUCKEYE CLEANSER

*THE AUTO SOAP THAT —  
CLEANS AND POLISHES*



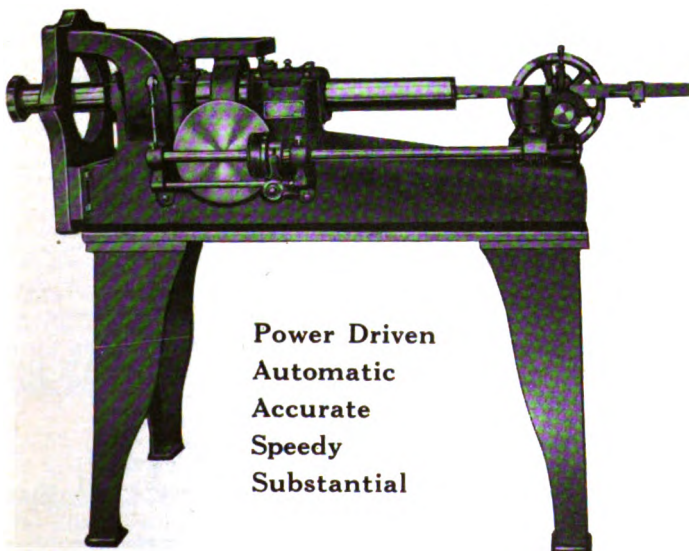




## Read The Above Letter Over Again —It has a Distinct Message for *YOU*

What they have done in Wausau can be done in Kankakee—Kalamazoo—Kokomo or Kansas City—can be done in every and any city in the United States—regardless of size—if you will install a

## Marvel **Cylinder** Re-Boring Machine No. 5



Power Driven  
Automatic  
Accurate  
Speedy  
Substantial

and will take advantage of our Business Building Service and will go after business.

Our proposition means not only the purchase of the Best and most Practical Re-Boring Machine Manufactured—a machine which will double the man power in your shop—a machine which is now in use by over a thousand Automotive Schools—Colleges and Repair Men—

It means that with a Marvel No. 5 we furnish you an Advertising Service that brings customers to your shop—It means that our Dealer Helps soon have your shop designated as the leader in your town.

### INVESTIGATE OUR PROPOSITION—

Let us tell you all about the MARVEL NO. 5—let us show you what it will do for you—permit us to send you samples of our Dealer Advertising. We will show you a campaign which will add Red Blood to your business and profit in your Bank.

It will cost nothing to find out—It will pay big to use.

**MARVEL MACHINERY  
COMPANY**

510 Loan and Trust Building  
MINNEAPOLIS, MINN.



The Sign of a Perfect  
Piston



# "NORMA" PRECISION BALL BEARINGS

(PATENTED)

It is not alone mechanical friction which "NORMA" Bearings minimize in the high-grade magnetos and lighting generators in which they are standard. Their trouble-free performance also minimizes friction between car owner and car dealer—and between car builder and apparatus maker.

See that your electrical apparatus is "NORMA" equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# American Garage & Auto Dealer

*Published Monthly*

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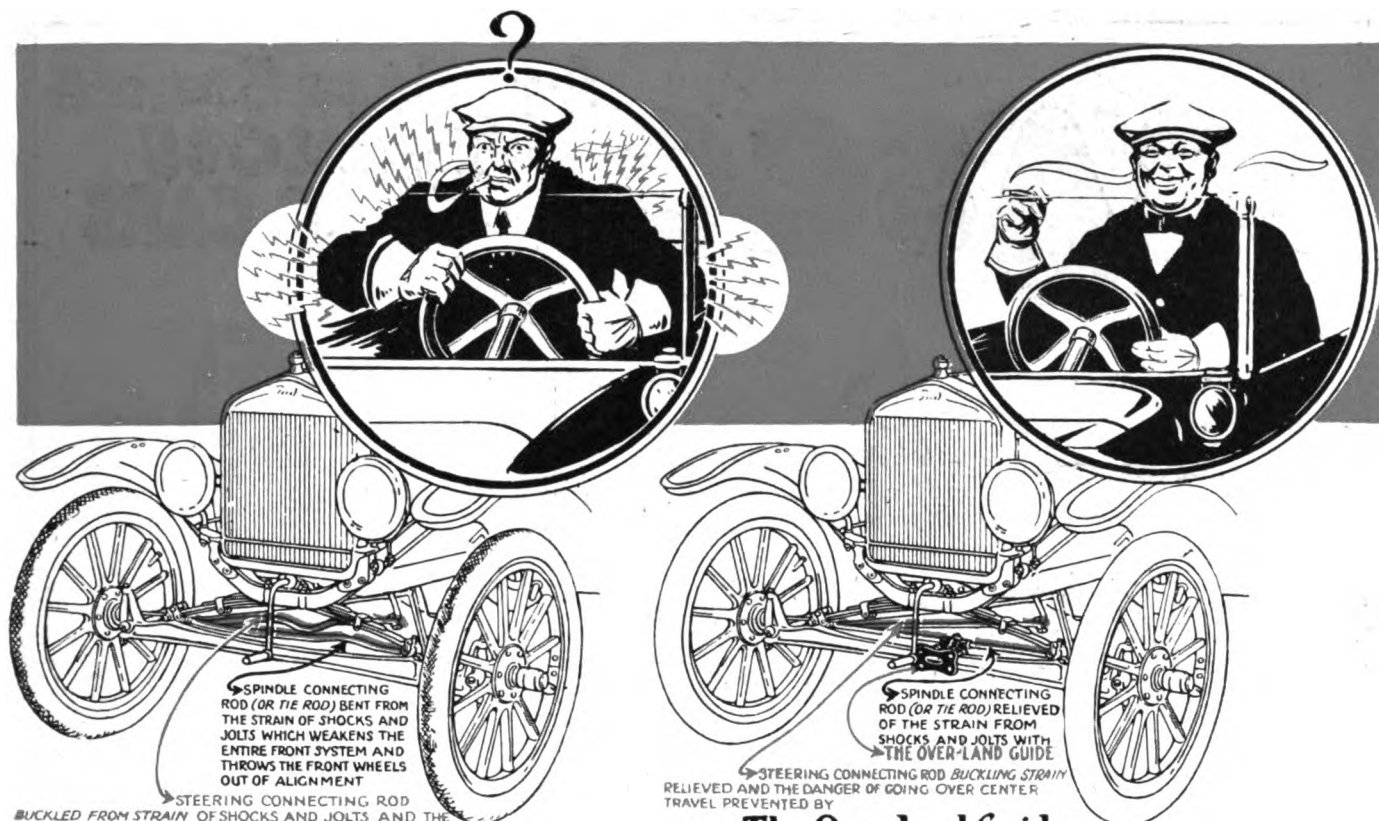
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The Over-land Guide

PATENTED

Controlling the Ford

A Ford Controlling Itself

**The OVER-LAND GUIDE will save ten times its cost in one year on repairs alone**

This is a strong claim, but one that the facts will substantiate when the OVER-LAND GUIDE is installed on a Ford car or truck that is used constantly. The OVER-LAND GUIDE controls the Ford car or truck and holds the wheels in perfect alignment (*which means a saving of at least 30 dollars a year in tires alone*). It also relieves the strain on the front system and steering mechanism, as well as the arms and shoulders of the driver. By relieving the strain on the front system and steering mechanism, it prevents breakage; also wear and tear from general use which means a **SAVING OF TEN TIMES THE PRICE OF THE OVER-LAND GUIDE YEARLY**, besides eliminates the loss of the use of the car or truck while it is being repaired.

### Here are some of the things the OVER-LAND GUIDE will prevent

The bending of the spindle connecting rod (or tie rod).  
 The bending of the right and left spindle body (or knuckle) arms.  
 The danger of the steering gear connecting rod going over center travel which means the loss of control, and the possible destruction of the car and the lives of the occupants, is overcome by the Over-Land Guide.  
 The wearing out of the ball and socket joints on account of the jerking and wiggling of the front wheels. Will relieve the strain on the crank case from the jars and jolts of the radius rod, caused by rough roads.  
 The steering post bracket bolts which are loosened and their function lost by the constant vibration from jolting.  
 The steering gear internal gear case and bushings, steering gear drive pinion and steering gear pinions which are worn out from the strain of vibration.  
 The wearing out of tires from wobbling and scooting.  
 The collapse of the front wheels and saving of the wheel's ball and roller bearings by holding the front wheels in alignment.  
 Serious accidents that often accompany blowouts when the wheel with the flat tire acts as a pivot, which may throw your car from the road or into some rapidly moving car with the possibility of the destruction of the car and the lives of the occupants.  
 The possibility, when making a short turn, that the steering connecting rod will go over center travel, resulting in the loss of control which may mean a serious accident.  
 In addition to the monetary value of the service rendered by the OVER-LAND GUIDE it is life insurance to Ford and Ford owners.

**THIS BROAD GUARANTEE PROTECTS USERS OF THE OVER-LAND GUIDE.** Send us **\$8.50**, retail price, and we will send you parcel post, one Over-Land Guide. Use it 20 days, and if at the end of that time, you are willing to part with it, full purchase price will be refunded upon its return.

DEALERS—Write or wire for full information.

**THE MEIXELL COMPANY**

Office—216 Board of Trade Bldg., INDIANAPOLIS, IND.

The Automobile Sundries Company, Exporters, 18 Broadway, New York, N. Y., are the sole foreign distributors of the OVER-LAND GUIDE.



The OVER-LAND GUIDE bolts to the center of the front axle and the center of the spindle connecting rod (or tie rod) securely, relieving the vibration and strain in the spindle connecting rod (or tie rod) and entire front system, and the steering mechanism up to the steering wheel.

# CASCO Products for FORD CARS



**\$5.00**

**"Hold 'Em in the Road" for Ford Cars**

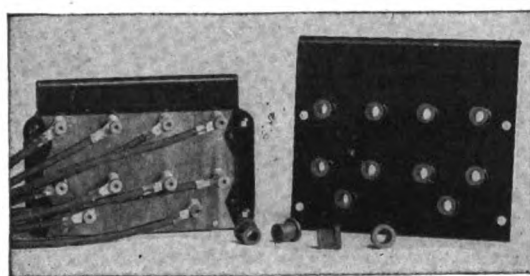
**Put on in  
a Minute**



**50c.**

Clamps here  
to Crank Case  
Flange

Clamps here to  
Crank Case  
Flange



## DEALERS

**"Casco" Specialties are big sellers among Ford owners. Write for particulars and trade prices.**

**"Casco" Products are handled by all Chicago Jobbers.**

## "HOLD 'EM IN THE ROAD"

Combines four valuable attachments—Radius Rod Brace, Anti-Rattler, Axle Support and Steering Device, all in one—Knocks kinks out of the axle, radius rod, wheel bearing, rattle. Knocks danger and kinks out of driver. Sells for \$5.00.

## "CASCO" FAN BELT GUIDE

Holds the belt so that it will not cut or run off. Relieves tension of belt obviating wear 100 per cent efficient. Attached in one minute. Sells for 50c.

## "CASCO" FORD COIL BOX PROTECTOR

A device that many are trying to copy. Be sure to get the genuine "Casco." Over 200,000 in use. Handled and endorsed by jobbers in 48 states. Protects coils from injury and dampness.

Rubber Insulated, \$1.50.

## "CASCO" OIL DRAIN COCK

The automatic, spring steel, ball seat, oil drain cock. In a class of its own. No cock-wrench—no "get under"—no loss—no leak—no worry. Pull the hook—see oil in engine. Sells for \$1.50 per pair complete.

*Those who offer for sale infringements are liable as manufacturers of infringements.*

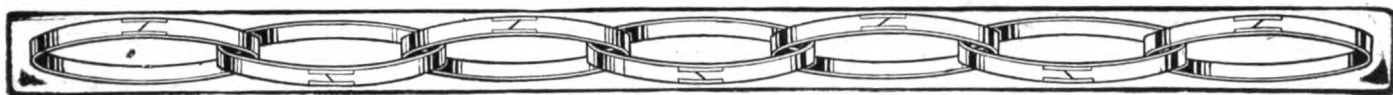
## CASCO MFG. CO.

Manufacturers

Thomasville, Ga., U. S. A.

EXPORTER  
Chas. F. Lyngsaa  
46 W. Broadway  
New York City  
Latin and Mexican

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# **BURD**

## *High Compression*

### **PISTON RINGS**

#### **Absolutely Cannot Leak**

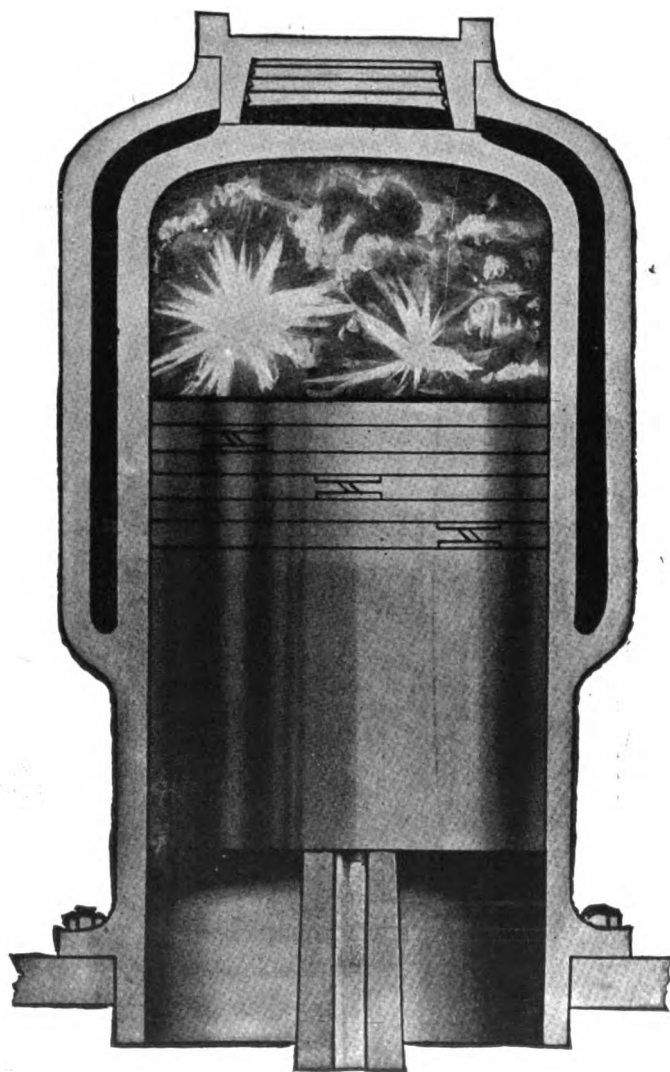
***Prevent Carbon  
Trouble, and Stop  
the Waste of Fuel,  
Oil and Power***

**The Patented Guard Auto-  
matically Compensates for  
Wear and Insures Oil and Gas  
Tight, High Compression.**

**Ask Your Jobber  
or Write**

**For Directory of Piston  
Ring Sizes, Price List, etc.**

**Burd High Compression Ring Co.  
Rockford, Ill., U. S. A.**





## TIRE-DOH Advertisements in these National Magazines this year assure you a substantial consumer demand

Over 30,000,000 readers of these six great magazines will be told about the merits and value of TIRE-DOH through our great National Advertising Campaign.

Several million car owners will learn how they can, with TIRE-DOH, easily repair their own punctures, rips, tears, etc., and also make repairs in any other kind of rubber goods.

This campaign is bound to create a record-breaking demand for TIRE-DOH.

Dealers are urged to anticipate their requirements and adequately stock up for the coming demand.

If you are not already handling TIRE-DOH, ask your jobber or write us direct for full particulars.

### ATLAS AUTO SUPPLY COMPANY

680 W. Austin Ave., Chicago





# American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,  
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XI. No. 2

CHICAGO

February, 1920

## Workers and Machinery.

The question of help is one that has been and is a serious one with many industries. A lack of satisfactory help has been responsible for the introduction of many labor-saving devices in the home, office and shop.

In the city home, the increase in the use of washing machines, electric ironers, vacuum cleaners, etc., in the past year or two, has been remarkable. The explanation offered is that housewives without this labor and time-saving equipment experience great difficulty in securing household workers. They prefer to work where modern labor-saving equipment may be used.

This predilection of workers for transferring the "ry" from "drudgery" to "machine," is not confined to the city; it is found in the farming region also. It's human nature to prefer machinery to drudgery. A tractor, a new thresher, milking machines or any of the new mechanical aids to farming are powerful influences in inducing workers to accept employment on farms.

There is a shortage of farm laborers and probably will be throughout the next harvest. Tractors and other farm power machines are doing a great work in recruiting men for the essential work of food production, say farmers who have come to a realization of present trends. It is a matter of pride to a hired worker to state that his employer has modern equipment,

one who strives to aid his men in every way so as to make his farm more efficient.

Naturally, most farm workers are mechanically inclined. They, therefore, are anxious to extend their knowledge of mechanics by operating

---

## Lincoln on Labor and Property.

The following words were spoken by Abraham Lincoln March 21, 1864, in an address to the Workingmen's Association, of New York. The thought expressed in these words was never more timely than at present.

**"Property is the fruit of labor; property is desirable; it is a positive good in the world. That some should be rich shows that others may become rich, and hence it is just encouragement to industry and enterprise.**

**"Let not him who is houseless pull down the home of another, but let him work diligently and build one for himself, thus by example assuring that his own shall be safe from violence when built."**

---

a tractor or other machines on the farm.

Following horse-drawn implements through the field is not such drudgery when the animals are well trained to the work, and the soil is not too resistant. Driving a tractor which readily responds to a turn of the wheel or a shift of the levers is, however, much more to the worker's liking.

These are some of the reasons why the tractor farmer usually has more

applications for work than the farmer who does not use modern power machinery.

Thus the tractor, motor car, motor truck, farm electric plant and other power equipment, are all becoming vital and essential elements in the efficient and profitable operation of farms, whether of the one-man size or 10-man size.

---

## Highways and Prosperity.

Transportation has always been a great factor in the development of a country. When this country was first settled, transportation was mainly by means of "shanks' mare" over trails, some of which could hardly be followed. Natural waterways were also utilized as transportation highways.

As trails improved, horses and mules came into use and these were followed in some sections by canals built to connect with natural waterways such as the Erie Canal between Lake Erie and the Hudson River. Railroads also were built and they were the great developing factor of the country. Cities were located along the line of railroads and the largest cities are now found where "rail and water meet."

The territories covered by networks of rail lines are the prosperous regions, due to transportation highways. Cities with many miles of well-paved streets are known as great and prosperous cities—ease of transportation is one of their features.

Rural districts with good all-the-season roads are prosperous, for the farmer can get his products to market easily and is in constant touch with the markets where his supplies may be quickly obtained. No longer is it a day's journey "to go to the city." In fact, the farmer when he goes to the city does not go behind old Dobbin—he journeys by motor in a very short time.

This, however, is not true of all parts of the country. For three months of the year people of a certain Southern state are practically shut off from intercourse with the outside world by highway travel.

"Worse than that," declares an influential Southern newspaper, "they cannot use the highways for local trade and travel. This is because they are served by dry weather roads—highways that are good while the sun is shining and during the rainless seasons, but ribbons of mud in wet weather."

During a season of wet weather the dirt roads of that state are practically impassable. It is not only the automobilist who suffers from this condition, but every farmer who has a bale of cotton or a wagonload of produce to haul to market. And it takes four mules or horses to haul only a small load.

The farmer who discovers that with modern traction he can move his product in the twinkling of an eye, as compared with obsolete methods, has discovered the means of doubling his business. Naturally, the first thing that occurs to the farmer on owning his first car or motor truck is that his machine is only as efficient as the road he must use.

If he follows out his plan of increasing his business efficiency, he puts his most necessary highways in order. Then he finds that his activity is restricted by the area of good roads and reasons that if all the other farmers would mend their roads, the capacity of the motor would be almost limitless.

The cities and towns have trunk lines which are capable of handling all

of the entering and departing traffic, so it is up to the farmer to see that means of moving his local traffic is provided. Good roads mean maximum capacity and minimum overhead; ruts and bumps mean tire depreciation, broken machinery, and repair bills. And mud tends to zero efficiency.

Good roads mean more business, more prosperity, and more automobiles. Let's have them!

### **The Live Man.**

It is said that some men can see farther than others; in other words, their powers of observation and deduction are greater. Two persons, observing a given method of doing a certain

---

### **QUALITIES FOR SUCCESS.**

**"There are qualities that go to make a man really successful. A man must have personality—that is very important. He must have industry, application, and common sense—no man can do much if he has not been endowed with a reasonable amount of brains. He must earn a reputation for unimpeachable integrity; he must tell the absolute truth; he must cultivate good fellowship; he must be a man other men like and trust. Optimism, cheerfulness, readiness to encourage and inspire others also help.**

**"Any man can learn to do anything that any other man has done, if he will apply himself to the doing of it."**—Charles M. Schwab.

---

kind of work, receive different impressions.

One has no comments to make, but the other has picked out certain portions of the process where improvement can be made. He has used his eyes and his powers of deduction to better purpose than his companion.

A man of this type is known as a "live" man because he sees things; sees their faults and thinks of a remedy. It may be that his first suggestion is not well taken, but that does not discourage him. He keeps on thinking of new ways of doing things and can explain clearly and logically why they are an improvement over the old methods.

After a while he is recognized as one who does things in ways that are effective and efficient. He has earned the title of a "live" man.

### **Scientific Management Principles.**

The scientists call this "the scientific age." We heard, a good deal, before the war, of "scientific management," and now with H. C. L. on every hand thought along that line is important. The doctrines of management require that in the treatment of any given problem, the steps taken shall be in the following order:

First. Find out every discoverable fact, force, or factor bearing upon the problem.

Second. Find the correct relative value or importance of every separable fact, force or factor.

Third. Devote to each fact, force, or factor, the proportion of time, the degree of attention and the amount of effort that its relative importance demands.

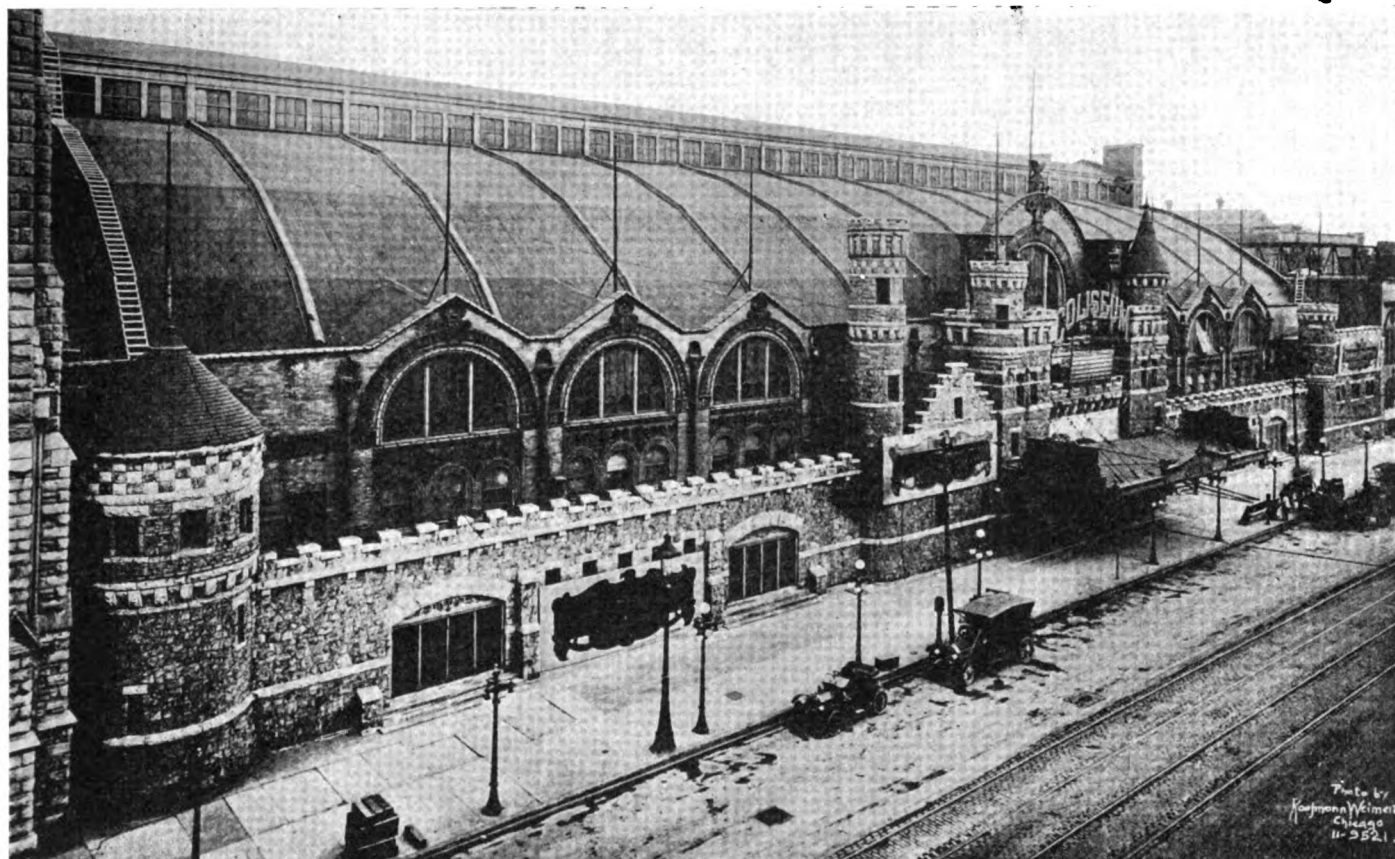
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### **Selling the Prospect.**

Conditions change and methods necessarily change with them. With the great number of automobiles in use, owners have become experts in the theory at least, if not in the actual operation, of the motors and the numerous accessories.

When they go to purchase a new car or motor truck, they know what they want and ask many questions—and if the salesman makes a statement that is not correct, he is quickly called to account. The purchasers no longer take the salesman's word on cars or accessories. They carefully look into the car's mechanism and the various features before buying.

No longer does the talk about soft cushions and artistic finish sell the car. Salesmen must know the technical details of what they have to sell. The greater his understanding of automotive mechanical construction and operation, the more successful he will be in converting prospects into buyers, of cars, tractors, or accessories.



# Chicago Show Indication of Big 1920

Dealers Represented Far Greater Area of America and More Foreign Countries Than Ever Before—Prices May Go Up—Deliveries Will Be Slow—But, All in All, 1920 Will Be Most Successful Year of the Automotive Industry

In the opinion of many trades' people and men prominent in the automotive industry, the Chicago show was the world's greatest exhibit of automobiles and trucks ever staged.

The Chicago show usually is more than a sightseeing show for the public—it is a dealers' show. The central location of Chicago and the great sales' field for the automobile and truck make it a rendezvous for dealers from all parts of the country and plenty of them were there, from California, Texas, North Dakota, yes, even Boston. Chicago was flooded as never before.

The automobile show of passenger cars was held at the Coliseum, Coliseum Annex, Greer Building, and First Regiment Armory, while the national motor truck show of commercial vehicles was held at the International amphitheatre.

The number of passenger cars exhibited amounted to 84; the number of

motor truck exhibitors, 65; the number of passenger car accessory exhibitors, 163; and the number of motor truck exhibitors, 67. The lowest priced passenger car sold at \$715 and the highest priced at \$11,000, evidently the same cars that were exhibited at the New York Show. Truck prices ranged from \$935 up.

The car and truck buyers attended the exhibition in numbers which far exceeded any previous attendance. The figures are not ready for announcement, but Manager S. A. Miles and other officials state that the attendance has set every previous record far in the background.

It was a buying crowd which didn't give a rap about the H. C. L. Brisk sales were made from the very start, and many manufacturers who could not book more orders, were elated by the interest shown by their dealers and distributors. On almost every occasion the banquets for dealers and dis-

tributors and the luncheons put on by the manufacturers drew larger attendances than in any previous year and the participants represented a far greater area of America and more foreign countries than ever before.

The Chicago show in every way indicated that 1920 is going to be the most successful year in the automotive business, and this year probably will see more car and truck sales than ever before. Even if prices do go up, and they probably will, there will be no falling off of the demand for all classes of motor vehicles.

Delivery was the big point talked of and it is certain that early deliveries are out of the question. Every far-sighted business man believes this, for he realizes that for an enormous industry like the manufacture of motor cars and trucks, plans are made and material orders placed months, even years in advance of the contemplated time of car production.

The much talked of "saturation point" as far as it applies to motor vehicles, is as distant today as it was five years ago and dealers who failed to get their orders in better run like everything because—

The war caused thousands of people to learn how to operate cars, with the result that the demand is going to be greater than ever.

The indications point to the fact that the H. C. L. is not bothering many people and the sales in 1920 are going to be bigger than ever before.

The shortage of labor, and the steel and coal strikes retarded the making of cars and trucks.

The foreign demand for American cars is greater than ever. This means that a longer period of time will be required in order to supply the demand in this country.

Car and truck prices are going to be raised.

Deliveries will be slow for the next six months.

Competition will force smaller manufacturers to drop out of the game or be absorbed by larger companies.

#### Truck Show.

In conjunction with the automobile show, the national motor truck exposition held at the International Amphitheatre was a greater success than anticipated, and the number of dealers in attendance was particularly gratifying to the exhibitors.

Four separate parades, covering all sides of the city, preceded the formal opening. Loaded with merchandise, they gave the spectators a close-up and practical demonstration of their utility. They astounded many who have not followed the amazing growth and spread of the motor truck during the last few years.

Inside the amphitheatre the visitors saw the greatest collection of commercial vehicles ever gathered under one roof.

Trucks on display ranged all the way from the small ones used to carry laundry and groceries about a city or town to the big "dreadnaughts" that look large enough to pull a tall building from its foundations.

Judging from the crowd of visitors that thronged the enormous building every day and night, the prediction that the public is interested in motor trucks seemed correct.

#### Accessories.

In the number of exhibitors and the

amount of space allotted, in the variety of designs and products shown, and the keen interest displayed by the entire industry and by automobile users, the accessories exhibit surpassed all previous national exhibitions.

Twenty years ago the exhibits of

### What Is to Be?

In this day and age, there's nothing more obsolete than last year's model, but there's always a crowd around this year's car.

The world moves irresistibly forward—onward. There's no standing still. Those who do not progress fall behind. What is to be—in motor car design, manufacture, delivery, demand, and sales—commands our attention.

Interest centers in the future—not in the past, and the automobile show is the crystal glass of the industry. This year the shows brought out these facts:

The war caused thousands of people to learn how to operate cars and trucks, with the result that the demand is going to be greater than ever.

The indications point to the fact that the H. C. L. is not bothering many people and the sales in 1920 are going to be bigger than ever before.

The much talked of "saturation point," as far as it applies to motor vehicles, is as far off as it was five years ago.

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The foreign demand for American cars is greater than ever. This means that a longer period of time will be required in order to supply the demand in this country.

Car and truck prices are going to be raised.

Deliveries will be slow for the next six months.

Competition will force smaller manufacturers to drop out of the game or be absorbed by larger companies.

The manufacturers of accessories are keeping pace with the makers of cars and the owners are becoming educated to the advantages and economies of automobile and truck accessories, and consequently the sales anticipated for 1920 will be bigger than ever before.

the parts and accessory industry show consisted only of a few spark-plugs, a handful of overgrown bicycle tires, one or two rather wobbly oil lamps for cars, and a few other well intentioned but far from modern parts and accessories.

Today the parts and accessories field is strongly organized through the motor & Accessory Manufacturers' Association, with a membership of more than 360 companies making automotive equipment—everything from license plate to headlight and from tops to tires.

The owners of cars and trucks are also becoming more educated to the advantages, and the economies which can be effected by the use of motor vehicle accessories, so that the volume of business this coming year in this field is going to be bigger than ever.

#### Recent London Automobile Show Draws Great Crowds.

The report of the recent London automobile show states that a total of 36,000 persons passed the turnstiles the first day. Some disappointment was experienced in the fact that there was no development of a practical, cheap, English car and that there had been little accomplished in the way of weight reduction. The more reasonably priced cars, the result of careful, skilled workmanship, were only cheaper than those of more luxurious types because of their smaller size.

It was estimated that the value of orders booked for future delivery would amount to millions. The only difficulty is that the British motor industry is faced with the accumulative demand of the past five years and tremendous difficulties as regards labor, transportation, and shortage of materials. For practically all of the British makes, delivery could not be guaranteed in less than three to six months' time.

#### Market in England for Trucks of Lighter Type.

The demand for light trucks of one-ton and 1½-ton capacity is very pronounced in England, according to London representatives of the Napoleon Motors Co. While the country is overstocked with heavier trucks, owing to the recent war, there is a market for those of the lighter type, and as the remarkable roads allow high speeds, conditions are more than favorable.

It is stated that in England little attention is paid to the appearance of a truck in respect to paint and decoration, but great stress is placed on the oiling and greasing of the vehicle: at least one hour a day is spent in giving the motor proper lubrication.



# Successful Sales-Building Ideas

Every Wide-awake Dealer Is Anxious to Secure a Bigger and Better Business This Year—To Do This Requires Increased Selling Energy, New Ideas and Business-Building Methods—Here Are a Few Ideas and Suggestions

By Walter Engard

During these days of keen competition, the merchant who wishes to build up a successful business can no longer content himself with the thought, that if business doesn't come today it probably will tomorrow. Unless he wants bankruptcy, he must be up and doing. Business today is a sort of a warfare that calls for alertness, initiative and push—it is a survival of the fittest.

The modern merchant has come to a realization that he must do more than merely buy goods, and though he realizes there is much truth in that old adage that "goods well bought are half sold," yet he knows that "goods all sold, were well bought."

While buying is a very important factor in business success, selling is by far the more important. The wide-awake dealer does not content himself waiting with full sleeves for a customer with a desire for his wares to come in, instead he maps out a business-getting campaign and gets behind it with all the pep and enthusiasm he can muster—what may better be termed "go-get-it-iveness." He does not wait for trade to come to him, instead he goes out into the highways and drives the trade into his store, so to speak.

It is fair to assume that every wide-awake dealer is anxious to secure a bigger and better business during the year of 1920 than he enjoyed during

1919, and to do so will require an increased fund of selling energy, new ideas and real business-building methods. Any new idea, or some method that has been used successfully by an-

business. Here are a few ideas and suggestions, a number of which, no doubt, you can apply to your business with success:

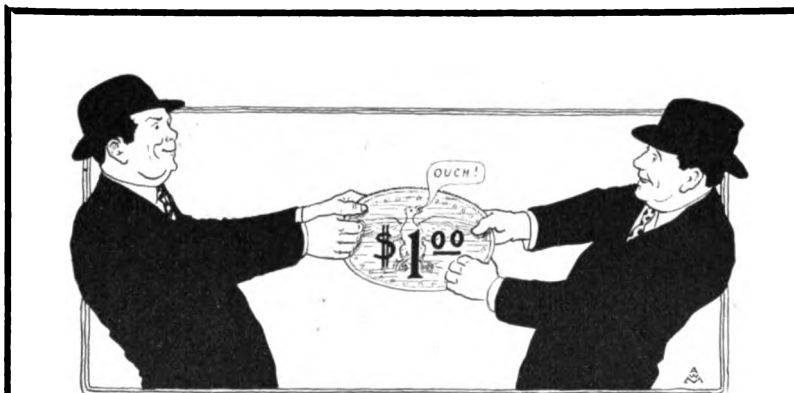
One enterprising garage and accessory dealer staged a very successful sale which he termed "Dollar Stretcher" sale. During this sale he offered a great number of items at attractive prices to reduce his stock and to stimulate sales during a dull season.

To advertise this sale he got out a very attractive circular, at the top of which he used an illustration, showing two men pulling on a dollar—and the dollar was stretching considerably. This circular, together with a letter, was mailed out to a long list of customers and resulted in a nice increase in sales during the period.

The blotter is a much-abused article of advertising owing to its common use. Nevertheless, when used properly, it offers an excellent advertising medium for the accessory dealer who desires to keep in touch with his trade. One wide-awake dealer gets out a blotter upon which is printed the calendar for the month and distributes it to his trade

by mail the first of each month.

His blotter serves the customer in two ways—as a blotter and as a calendar. The recipient is sure to make use of it, and for this reason, this dealer's advertising thereon extends over a longer period. On each month's blotter, he runs some advertising ma-



## Dollar Stretchers

A WHOLE LIST OF THEM

(Over)

*We are following the custom of the wholesalers in offering, after inventory, a list of accessories at special prices to reduce our big stock and to stimulate trade during a dull season. Our loss is your gain. Go over the list on the reverse side carefully—no doubt you will find a great number of items you will need in the near future. Buy them NOW during this DOLLAR STRETCHING SALE and make your dollar go farther.*

## Main Street Garage

The Attractive Circular Which Was Mailed to Advertise Special Sale.

other, may be just the thing that will enable you to put the stilts under your sales and boost them higher. For this reason, you should keep your ear to the ground and note the various plans and methods others are using to build up sales, and then carefully consider them in relation to your own

terial, telling something specific about his business, its policy, or its goods. For instance, on one month's supply he used the blotter illustrated.

This blotter resulted in a big sale of spark-plugs. On another blotter, he ran:

Bring around your Oil Can and let us fill it with Blank's High Test Motor Oil. Special this month:  
Light, 5 gal., 60c a gallon  
Medium, 5 gal., 60c a gallon  
Heavy, 5 gal., 61c a gallon

This advertisement increased his oil sales more than 20 per cent over the preceding month. Still another one was:

"This month we are offering Stewart's "V-Ray" Spotlight at the low price of \$4.95. You can't afford to overlook this bargain. Come early."

As a result, he sold more than two dozen during the first two weeks. The immediate results from this medium each month more than offset the cost, to say nothing of the "good will" and "prestige" it built for his store.

Store service is a big factor in making regular patrons. One of the ideas which warms any autoist's heart toward the dealer, is to know that no matter where he may be and is in trouble, all he has to do is to call the dealer and help is extended. Such is the service rendered by one successful dealer to his many patrons through maintaining a motorcycle equipped with a side car ready for every emergency.

If the customer has tire trouble and

needs a new tire, although he may be 10 or 15 miles out in the country, all he has to do is to call the dealer by telephone, let his wants be known, and a tire is taken to him by motorcycle.

is profitable for the dealer on account of the large volume of business received because of it.

During the summer season one dealer, located in a small rural com-

1919	DECEMBER							1919
SUN	MON	TUE	WED	THU	FRI	SAT		
7	8	9	10	11	12	13		
14	15	16	17	18	19	20		
21	22	23	24	25	26	27		
28	29	30	31	Jan 1	Jan 2	Jan 3		

Special This Month  
4 for \$3.60

**CENTERVILLE GARAGE**

**Blot out your spark-plug troubles and increase your mileage by using Blank & Blank Spark-Plugs. For sale at the place known for its service.**



The Blotter—An Excellent Advertising Medium for the Live Dealer.

Or it may be oil, or gasoline, or a number of different items, that are needed—no matter how small or large the order, it is taken to him as quickly as the motorcycle can carry it.

A very nominal charge is made for this service. That the trade appreciates this service is self-evident from the large number of calls made for it. This dealer is constantly playing-up this service through his advertising copy and by mail. It has been the direct cause of bringing him a number of large and profitable accounts.

The charge made for the service is sufficient to cover the cost of maintaining it, yet so reasonable that customers do not object to paying it. It

munity, takes advantage of the fact that a large number of farmers come to town Saturday evening, by staging a Saturday Night Special, usually featuring one special article. Each week he advertises some well-known article at a special price, good for Saturday evening between seven and ten o'clock only.

During the latter part of the week, he displays this special article in his windows, accompanied by a suitable show card announcing that it will be on sale Saturday evening at such and such a price. This special is extensively advertised through the columns of the local newspaper, and as a result, a great many people visit his (Concluded on page 48.)

## Announce

Your presence by pushing the button at the curb---we are at your service.

Another exclusive feature of the

**Allen Garage**

Phone 173

15 Main Street

An Announcement Card Which Brought Many Sales.

Mr. John S. Smith

City

IN ACCOUNT WITH  
**THE CENTERVILLE GARAGE**

Centerville, Ind., Dec. 1, 1919.

I Call you owe at our store, where you will find a complete line of accessories. . . . .

A Statement That Pleases and Brings the Customers Around.

# Facts About the Tire Repair Business

Whether You Are Doing Tire Repair Work or Not, Be Sure to Read This Letter Which Was Written by a Successful Tire Repair Man—He Says Some Interesting Things About the Business and the Qualifications Necessary for Success

By G. R. Carmichael

[EDITOR'S NOTE: We believe that everyone who reads this letter will agree that it is very instructive and interesting. Mr. Carmichael is a tire man of considerable experience, who believes in giving a person his money's worth. He does not approve of the idea of taking a tire for repairs if its condition does not permit satisfactory results. He believes in quality and in charging for the service. He tells many things about the tire business that you should know, immaterial of whether you are doing tire repair work or not.

The correspondence originated through Mr. Carmichael's sending samples of his tire shop advertising to *The Traveler*, a publication of the Haywood Tire & Equipment Co.]  
Perth Amboy, N. J.  
November 13, 1919.

Gentlemen:

In answer to your inquiry of November 10, 1919, I wish to state that any and all advertising used by myself is of my own origination. However, as I only advertise facts, there appears nothing very unusual in getting out an advertisement or writing to a prospective customer, although I do so in as compelling or otherwise interesting way as possible.

We keep accurate account of all tire repairs, and we never repair a tire that is not worth repairing. When a tire comes into the shop, it is inspected thoroughly by one of the men. If passed, it is repaired—not patched—but really repaired.

We guarantee all spot jobs for the life of the tire, and all sections and rim cuts for four months, not that they do not last longer, but we figure that if a man gets three months' wear for the price he pays, he is getting as much and more than he paid for, and if he does not use the tire after it

has been repaired—that's his own fault.

Before it is placed in the vulcanizer the tire is placed in the record book as follows:

Owner's name: Make of tire: N.



S.: Plain: Mileage condition: Section rep.: Rim cut rep.: Loose tread rep.: Cost: Date: Serial number: Miscellaneous.

We have an embossing machine and each repair is easily taken care of by looking at the date and serial number. The embossing machine has paid for itself several times over, although at the time it was bought it cost \$87.50.

Our average repairs each day amount to eight tires, including cord tire sections, fabric sections and rim cuts, and spot jobs, and for the whole of last year there were less than 25 adjustments or repairs done over at

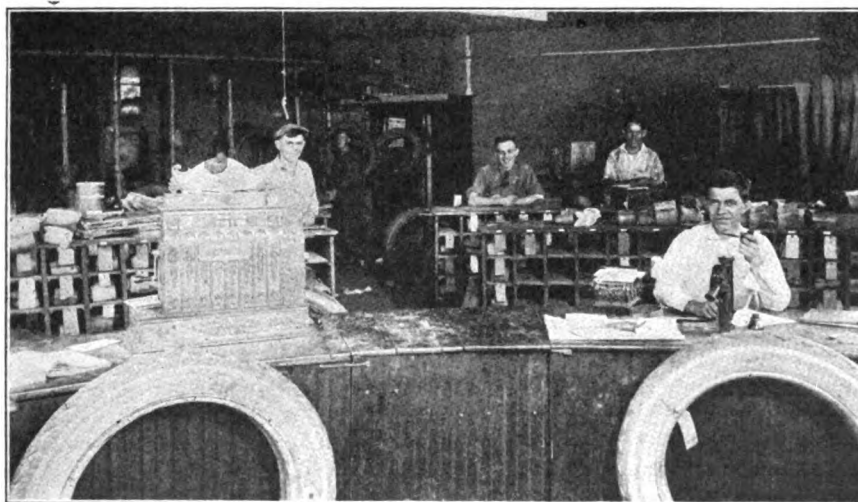
no charge, and I can not remember of ever having lost a customer through the fault of the work; however, we do lose a customer now and then over price, but as we are always gaining new ones, it compensates to some extent for the customer lost, but by referring to your Bible you will see that the greatest man that ever lived could please or convince only a small part of the people of his time. I figure I have a fat chance of pleasing all the people all the time in my time, and could not do it if they wanted me to, so I threw that worry on the scrap heap long ago.

They say that money is the root of all evil—and there are more tire repairmen who can not see above the root than those that can, by a great majority. "Get the money" is their motto: do it quick and cheap—he probably lives out of town anyway, and would not come back.

Those fellows have butterfly life for a while, but a caterpillar existence the rest of their tire-repairing life, unless they go far away from their former location, and get down to common sense, open their eyes, produce quality work, and then they can look any man in the face and say, "I earned every cent you have paid me, and if you do not think I did, tell me how much it is that I owe you and I'll give it to you in cash."

As a rule, the majority of tire repairmen are so afraid of competition; they know how it should be done and do it, but do not get enough money for their work and about the time they find it out, the sheriff comes around with a notice that they either pay or get out. Well, such a repairman figures this way:

"I may as well get out, the public does not appreciate good  
(Concluded on p. 44)



The Interior View of the Tire Shop, Where Quality Is the Keynote.

# Watch Your Collection Letters!

The Manager, Was a Good Salesman but a Poor Collector—He Admitted It—  
Besides, He Was Quick Tempered—Both Facts Were Responsible for the Loss  
of \$465.75 and the Information He Obtained Concerning Collections

By Harry Botsford

Charlie Cron, manager of the Modern Service Garage, was a good salesman but a poor collector. He admitted this fact after his bookkeeper had called his attention to the account of young James Woodring, the son of a prominent lawyer. Young Woodring was a high flier for a young man and had bought a car and a large number of accessories from the Modern Service people who were very willing to give him credit, inasmuch as his parent was a wealthy and influential citizen and had guaranteed the account.

Cron took the bill over and was astonished to note that it was for \$465.75 and had been running for three months. The bookkeeper stated that Woodring, Jr., had been billed regularly and that two bills for the amount had been sent the father with no apparent results.

Of course, Cron knew that the bill would be paid by Woodring who, as a rule, was very prompt in paying his bills. But it angered Cron to think that, in this case, he had paid no attention to the statements which were sent to him.

As I said, Cron was a poor collector; added to this, he owned a hair-trigger temper. Both facts were responsible for the letter he at once dictated and mailed to Woodring, Sr. The letter itself, he thought a model. In it he gave a detailed account of the behavior of the son and added a blustering opinion of such behavior. To be exact, the final paragraph read:

"The action of your son in this case is inexcusable. He will be sued at once and all publicity given the case unless this bill is settled in full within 24 hours."

Charlie Cron, manager of the Modern Service Garage, never made a greater mistake in his life than he did when he wrote this one paragraph. The next day he was called to the office of Woodring, Sr., who gave him the choice of handing over a receipt

in full for the amount of his son's account or facing a charge of blackmail and libel. Cron, sure of his ground, indignantly refused and was shown out of the offices. On the way to the garage, he became rather doubtful as to how he actually stood and called at the offices of his attorney.

He came out of the lawyer's office scowling. He had learned many

He was guilty on both counts in his letter, and there was not a single loophole to escape the situation with its severe penalties. The next morning he made out a receipt in full to Woodring, Jr. and sent it to his lawyer with instructions to give it to Woodring, Sr. upon return of the letter in question. It was a hard lesson and Cron will never forget it because it cost him \$465.75, plus an attorney's fee.

In common with all garagemen, Cron was not a fool, even if he was a poor collector and quick-tempered. He possessed a certain measure of shrewdness and made up his mind that he would never again be guilty of making the same error. To be absolutely sure of his ground in the future, he once more called on his lawyer for advice in regard to the writing of collection letters and the real legal limits to which he was actually confined.

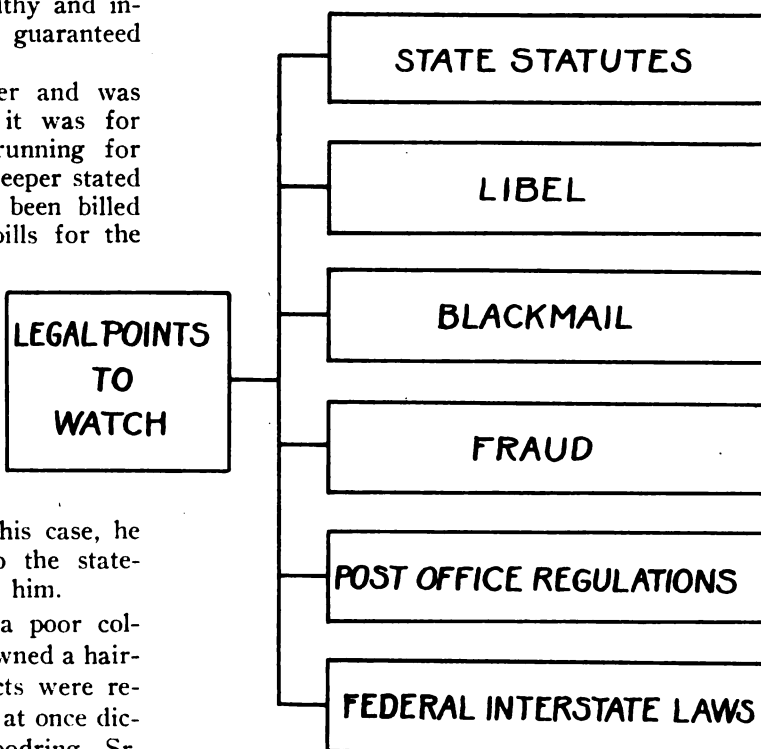
The advice he received from the lawyer, a man well qualified to pass an opinion, was valuable and interesting. It contained many points with which he was not familiar and by heeding it he believes he was

saved some more costly suits and threats of suits.

There were other pitfalls, he found, for the unwary and uncautious correspondent to avoid. Fraud is a careless man's trap which may be sprung by an apparently unimportant point in a contract. In order to keep his letters—his collection letters, especially—on the safe side, he found that he must keep posted upon postoffice regulation, interstate laws and state statutes.

The postal laws, he was told, were enacted to prevent the use of the mails as an instrument of fraud and

(Concluded on Page 44)



things in a brief 15 minutes. He had always understood blackmail as the extortion of money for the promise of silence about a disgraceful secret, and believed libel to be false statements in regard to the reputation of a person. He was wrong in both cases. Blackmail, he found, is defined according to law, as "extortion by means of intimidation; especially extortion by means of threats or accusation," while libel is held to be "any statement published without just cause or excuse, expressed either in print or writing, tending to expose another to public hatred, contempt or ridicule."



# "Bill, Sum Fokes Is Born Nutts"

Just Becaws That Sloppy Chick Left the Stereing Wheel All Grees, We Lost One of our Best Customers—Then There's Spike He Writes Sines and Advertisements When There's a Bunch in the Stock Rume Going to Waist

By Frank Farrington

Dear Pete:

Weve got a ruf neck in our garaje that we call Chick and he dont care a darn how black he gets or who he rubs it off on, buleve me. The first day I was here he inishiated me. At leest he sed it was that, and when he got thru I lookt like Ide always lived in a cole mine.

Yesterday he had a car all reddy for a party and the party was a swell young daim who drives her own bug-gie, and its sum bote, Ill tel the world. But Chick, what does he care whose bote it is? When its dun he cums rolling her out to the strete and he gets out and goze back in to the garaje and the swell daim gets in with her fine close and her white gloves and she taiks hold of the whele and starts the enjin and then she s kratches her noze and leves a black streke on it and she happens to see her gloves and theyer black.

Insted of stepping on the gas and waiving the boss good-by she gets rite out and goze inside and says to the boss, "Kindly have your man cleen the grees off my car and the whele so a person can drive it without getting black from hed to fete and send it up to the hous and send your bil. Hereafter I shall give my bizness to a garaje operated by gentelmen." Then she walked out wiping the black streke off her noze.

Thats once the boss diddent have ennything to say, not to her. What he had to say to Chick was plenty and I havvent got time to rite it and ennyway Ide have to have a asbestus pensil to rite it with.

There was one of our best regular customers all shot to peeces as far as weer concerned, just becaws that

sloppy Chick left the stereing whele all grees. Wel, weve got orders now and we ought to had em before to see that the stereing whele and geer levvvers and dore handels and all thoze things on a car is cleened up spick and span when a car is turned over to the owner, and I want to tel you, Pete, if you can get black driving a car weve just run out, youll have to hunt for the place where the black is at.

But I was going to say that I hap-pend to be standing around when Chick got balled out and you cant

display rax and sho cards and things to help maik things sell better.

Ide seen sum of that stuf cum in and 1 or 2 things Ide seen used in a window, but most of it I never saw at all. So when I was working around there I kept thinking to myself whats the good of having a lot of sines and things out here in a pile where no-boddy sees em?

So when I got things cleened enuf I went and askt Bob about the ad-vertising things. I new bettern to ask Persy. Bob sed he diddent kno, to ask Spike. Spike is the feller who

writes the adver-tisements for the newspaper and he maiks sines and sumtimes he puts a display of things in the win-dow when he has time enuf to do it.

When I found Spike, he was maiking a sine and Ile say it was a bum one all rite. I diddent say en-nything to him but I went and got a sine out of that pile in the

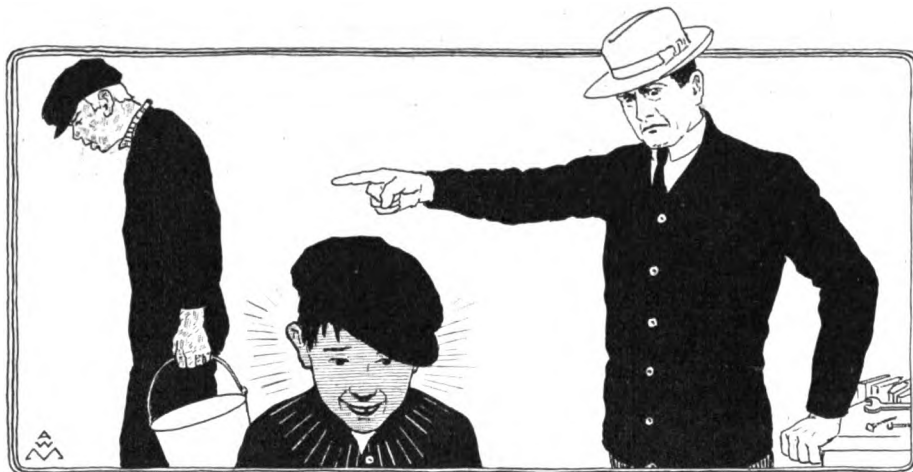
stockrume and it advertised just what he was maiking a sine for, "Speedy Tires." This sine that I got had a picture of a tire and a moovey daim sitting in it. Sum sine, buleve me. I took it in and shode it to Spike.

He lookt at it and then he lookt at his sine and he diddent say ennything and so did I, and after a few minits he got up and took my sine out and put it in the window with the tires he was going to advertize and he cum back and sed, "Bill, sum fokes is born nutts and sum goze to work and works hard getting to be nutts."

"How dyou get that way?" I asks him.

"Wel," he sed, "when the boss told me to fix sum tires in the window he sed maik a sine for em. That was

(Concluded on page 42.)



"William, kindly get buzzy cleening up the stock rume."

blaine me if I diddent shed enny teers and the boss he saw me snicker and when he got thru with Chick he just handed me this, "William, kindly get bizzy cleening up the stoek rume."

I diddent say ennything, but gee, the day before I worked on that stock rume all afternoon. I woodent get so sore just over seeing sumboddy laf a littel, not on a bet. Ine that way.

Theres one thing about it, cleening the stock rume gives you a chanse to think if youvve got ennything to think with.

While I was grubbing around out there I saw a pile of stuf over in a corner that I haddent notist before. It lookt like a littel of everything. I went over and lookt into the pile and it was all advertising stuf, sines and

# How to Install a Home-Made Forge

Your Garage Is Not Complete Without a Blacksmithing Outfit—Here Is a Good-looking Forge that You Can Build in Your Spare Time—Method of Building It from Material Which Can Be Handled by Average Mechanic

By David Baxter

Garage equipment is incomplete without some sort of blacksmithing outfit, particularly the garage located in a small town; for the small garage is often not as fortunate as the larger, modern establishments which afford a regular blacksmith department.

But whether the garage is large or small, its equipment should include some facilities for handling the usual run of blacksmith work if it intends to get all of the profit connected with the business of repairing automobiles. In fact, the garage mechanics are often seriously handicapped if there is not at least a forge and anvil in the establishment. They are forced to send all of this forge work, and most of the minor jobs, to the town blacksmith and probably wait for him while he is doing the work, in the bargain. This is a needless waste of time, as well as a loss of profit. The mechanic naturally is averse to adding a substantial profit to the profit of the blacksmith, and it is obviously quite unfair to the customer as well.

Of course, the average garage mechanic is not qualified to do all kinds of blacksmith work, but the numerous things he can do, if he has ready access to a forge, will more than pay for installing one, especially if there is no oxy-acetylene welding

plant in the shop. If the mechanic has a forge and anvil, he can bend and cut, flatten or straighten, lengthen or shorten, all kinds of rods, bolts, etc. In fact, he can do an infinite number of small jobs, not to

bars of iron to support the body or top of the table; the pipe to furnish the air duct and tuyere, and the cement and sand to form the body of the table.

First, let us build the table frame. No accurate measurements will be given for this, since it is much a matter of individual taste. However, we should be careful not to make the table too high or too big around. By referring to the illustration a good idea of how big to make it may be obtained.

For this table frame a standard 2-in. by 10-in. plank is probably the best. Cut this plank into proper lengths to form a rectangular frame about 3 ft. by 4 ft. To this frame, nail or bolt the legs as indicated in the illustrations. To the inside of this frame, nail some cleats consisting of two 1-in. by 2-in. strips of

wood. These cleats are nailed to the side or long sections of the frame and are for the purpose of supporting the flat bars of iron which in turn, support the cement body of the table.

The flat bars of iron which are to support the cement may be a quarter of an inch thick by any convenient width, cut to fit between the sides of the table, except near the center, where an opening is arranged and through which passes the tuyere. Near the end, where the chimney is located, an opening in the flat bars must

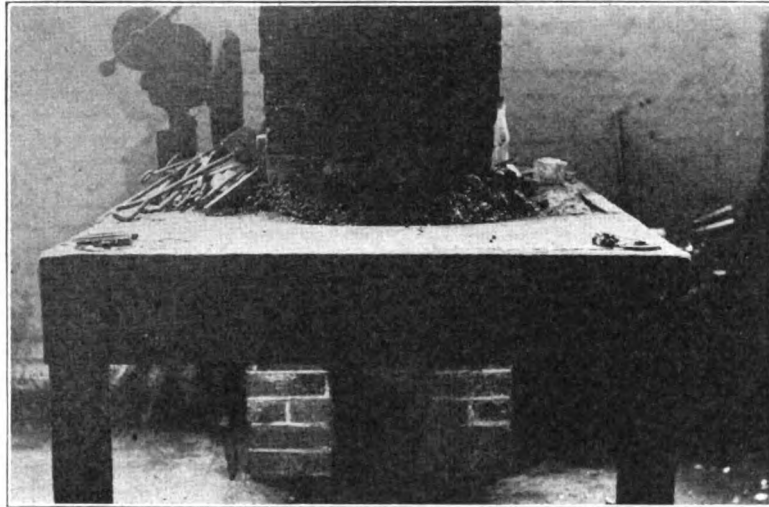


Fig. 1—Front View Showing General Construction of Forge.

mention the more particular blacksmithing work.

Is it necessary to buy a factory-made article? The mechanic who possesses a fair amount of ingenuity can easily construct a substantial forge with but few tools besides those already in the garage. Of course, he will probably have to purchase some of the essential parts, but as a whole the forge can be constructed of second-hand or junk material. At any rate, he can combine the new and the old to such an extent as to save money.

Now that we have decided that the garage should have a forge, let us see how to build one. And we might as well build it "good looking" as well as strong; there is no use "cobbling up" a forge when a neat one can be built just as easily.

The forge shown in the accompanying illustrations will fill the bill insofar as neat appearance, strength, convenience, and simplicity are concerned. It will be seen at a glance that the principal materials used in constructing this apparatus are brick and wood; both of which are easily handled by the average mechanic once he understands how to do the work.

The other essentials are: Some pieces of flat bar iron; several feet of galvanized piping, and a quantity of cement and sand, together with nails, bolts, etc. The brick is used for the chimney; the wood for the framework or the table; the flat



Fig. 2—Side View of Hand Blower.



Fig. 3—The Other Side of Forge.

be left. It is not necessary to have the bars touch each other; they may be a half-inch apart, just so some steps are taken to prevent the cement from falling through the openings.

If we are to follow the design of the forge illustrated, the next best thing to do, perhaps, is to build the chimney. We might have reversed the process and built the chimney first, constructing the table frame around it afterwards. However, before doing either, a suitable location in the garage should be chosen.

This should be where the light is good and where there is room on three sides of the forge to permit the handling of long rods, etc. It ought not to be situated in a corner unless this is unavoidable.

The chimney is laid in the form of a hollow square to the height of the table top with common mortar. Then the back and two sides are continued in the square shape the entire height of the chimney, which will vary according to the size and shape of the roof.

The front side of the chimney is built to extend partly over the fire with an opening to catch the smoke and fumes. The picture will, no doubt, show this better than words can tell it. However, it should be sufficiently large to create a steady draught.

With a plumb line or square the mechanic can build this chimney good enough for the purpose. It should be set flat on the floor and run up through the back part of the table as indicated.

The flat bars are arranged around the chimney in a way which will best suit conditions. An opening is also left through the chimney below the table top, through which the air pipe passes to connect with the blower. The part of the chimney below the table is capped over level with the table to prevent an under-draught. This is done as the chimney is being built.

With the table and chimney in place, we

are now ready to fill the table top with cement, but first some arrangement must be made for the firepot and tuyere iron which you expect to use.

This firepot can be purchased from any foundry, or it may be constructed of flat pieces of cast iron imbedded in the cement. It should be four to six inches deep with sloping sides and ends. Beneath it near one end is located the grate through which the air passes to the fire, and through which cinders are dumped to clean the fire.

blower is operating. The air inlet connects with the side opening of the tee, or it may be arranged as suggested later if no tee is used.

The joints of the pipe and tuyere are fastened together by welding or riveting. Arrangements should be made to fasten the tuyere to the bottom of the firepot. It can be held in place by the cement of the table body.

After constructing the air system and fastening it in place, we are ready to fill the

table with concrete. This is made by thoroughly mixing one bucketful of cement with four buckets of fine sand. It will require about double this amount to fill the top. After the cement and sand are thoroughly mixed, add sufficient water to moisten the mixture. One bucketful of water will probably be sufficient. Then, after adding the water, once more mix and stir until the cement and sand are moist throughout.

The substance is then shoveled quickly into the table frame, spread around, and packed firmly with the shovel handle or other handy tool. The surface of the cement mixture should now be troweled smooth. It should be troweled until the moisture is brought to the surface in order to obtain a hard face on the table top.

While the troweling is being done, the top should be

made to slope gradually from all sides toward the firepot. Special care should be taken where the cement joins the firepot and the frame to see that the troweling is smooth in order to prevent crumbling after the stuff dries. The cement should be allowed to dry a couple of days.

The blower is probably the only feature which will bother the mechanic when it comes to constructing this home-made forge, since he will no doubt find it taxes his inventiveness to the limit if he tries to make a practical machine. It can be done, but it is not advisable. The best

(Concluded on page 50.)

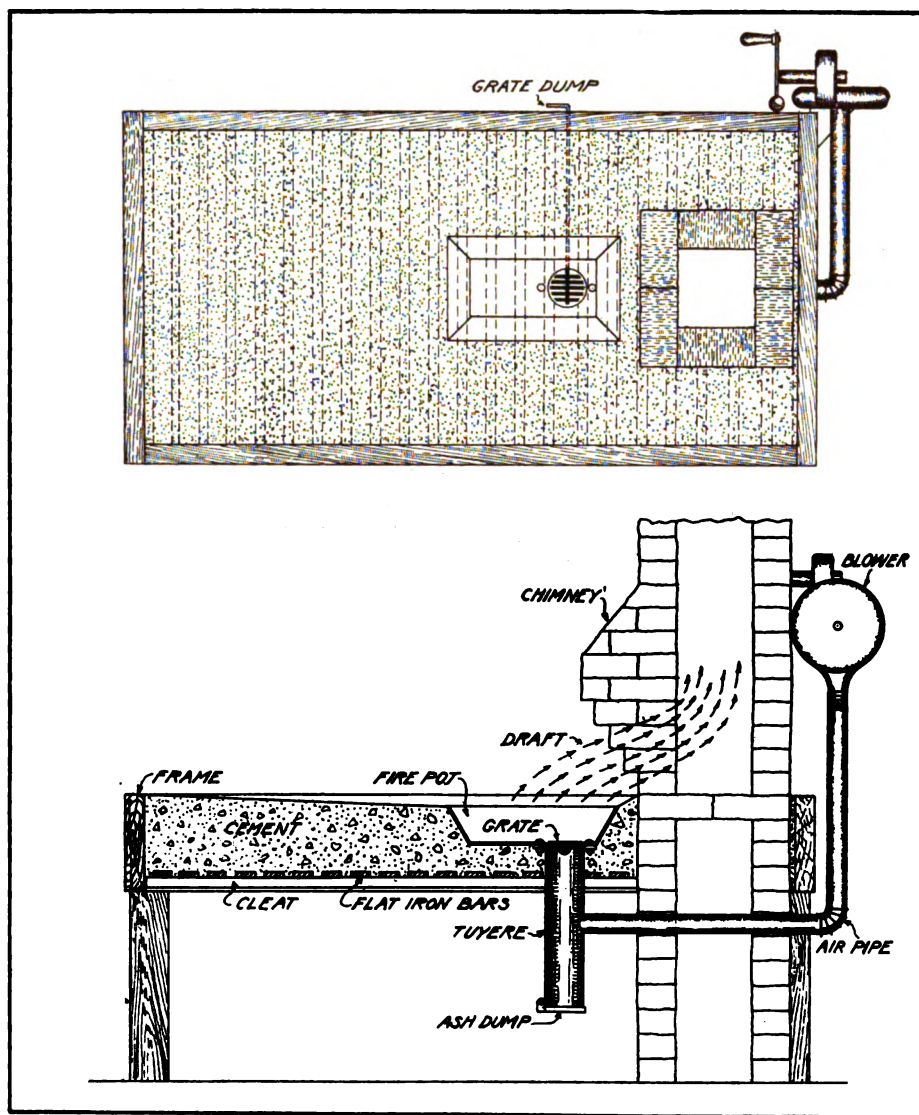
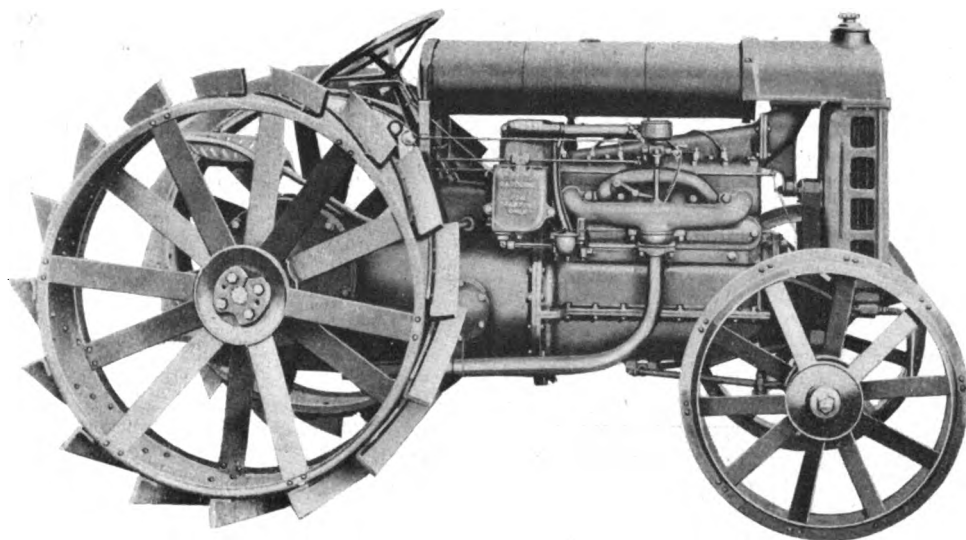


Fig. 4—Plan and Elevation of Home-Made Forge Showing Details of Construction.

This grate is conveniently made of a bar of round iron with cross bars at one end and a bent handle at the other. The handle is revolved to clean the fire and is suspended by loops or iron staples fastened to the floor or bottom section of the firepot, or it may be merely passed through two grooves at the top of the tuyere.

The tuyere is made of the three-inch sheet-iron pipe, either by welding or by employing a common tee. The lower end of the tuyere is closed by means of a slide passing through a slot, or by a hinged cap at the lower end of the pipe. The cap, or slide, prevents a loss of air when the



In This Article the Subject of Adjustments and Repairs to Kerosene Tractors Is Taken Up—Starting with the Engine a Brief Discussion of What Should Be Looked for When Doing the Overhauling Is Given — This Work, However, Is So Much Like Automobile Engine Repairing that Detailed Explanations Are Not Given — A Brief Outline of Ignition Adjustments and

# An Outline of How to Make Adjustm

One of a series of articles on the operation and repair of kerosene tractors which every garageman will find of value in his business

By E. C. Pohlmann

The work which the repairman is called upon to do in connection with tractors can be divided into adjustments and repairs. Under the first heading come all such attentions which have to be made when the tractor engine or running-gear assembly does not function properly—that is, when the tractor balks, spits, kicks, stalls or refuses to go because of some ailment.

Under the heading of repairs comes all work which temporarily puts the tractor out of operation, such as valve grinding, carbon cleaning, bearing adjustments, installation of new pistons, piston rings, bushings, brake lining, gears, etc.

In most cases, adjustments and repairs are so closely allied that it is hard to separate them and, consequently, both adjustments and repairs have been merged under the various units of the tractor.

## Engine.

In any tractor the most vital part is the engine. It is therefore the part which will require the most attention as to adjustments and repairs.

Most of the tractors are equipped with four-cylinder engines. These are so similar to the automobile engines that an extensive explanation is not necessary. So since space limits us, we will only touch the important and salient points, those to which the average repairman should give special attention in making tractor engine adjustments and repairs.

The efficient operation of the tractor engine depends primarily on the compression. If it is poor, the power developed is weak. Therefore, it is very important that the repairman be on the lookout for weak compression. This can be detected by turning the engine over by hand and comparing the

compression in the cylinders with each other.

If the compression is weak, it may be due to improper pushrod adjustments, the valves may be covered with carbon and need regrinding, or the pistons may be worn and otherwise do not fit properly.

The amount of clearance between the valve stem and the tappet or pushrod should be about two thicknesses of writing paper on the intake side and three thicknesses of writing paper on the exhaust side. Remember that this clearance is not the

bustion chamber and high temperatures with resultant improper lubrication, cause the engine to quickly carbonize and the pistons, rings and cylinder walls to wear rapidly.

For this reason the valves have to be ground oftener, carbon removed frequently and even piston rings replaced with oversized ones or cylinders rebored. In blanketing the conditions of the engine do not be guided too much by the experience you have had with automobiles; rather take into consideration the number of hours the tractor has operated, the condition of operation and the attention it has received.

To grind the valves proceed as you would on an automobile engine, except bear in mind that the tractor engine valves are more likely to warp. For that reason it is best to test each valve separately.

This can be done after first grinding the valves, so that they are bright, by painting them with prussian blue mixed with oil, and then grinding the valve in three or four turns. If the prussian blue is ground in evenly all around, the valve is perfect. If, however, a place appears where the prussian blue is not ground in or only slightly so as compared with the rest, the valve is warped or the stem bent.

Some mechanics test the valves for warpage by drawing pencil marks across the face about  $\frac{1}{8}$ -inch apart instead of using prussian blue. This is a cleaner method and is just as satisfactory.

If the valve is only slightly warped or bent, it can be trued in the lathe and the seat reamed with a reseating tool. Otherwise, it is best to grind in a new valve.

Should the loss of compression be due to leaky piston rings, careful examination

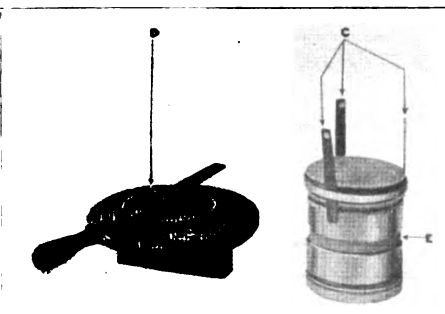


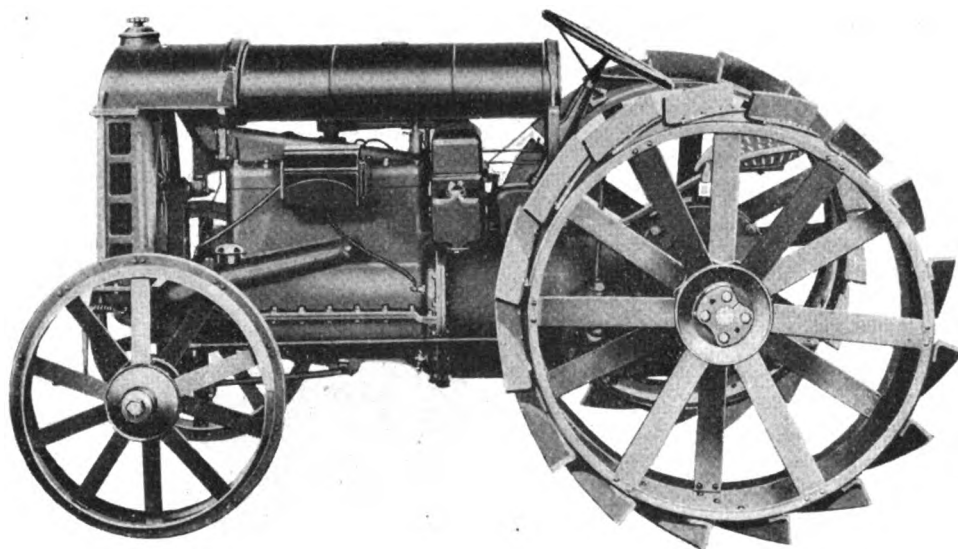
Fig. 1—Fitting Piston Rings.

same as for automobile engines. The tractor engine is subject to higher temperatures and, consequently, more expansion; hence, the clearance has to be more. The clearance, however, should not be more than specified, for if increased, it will cause noisy valves and a loss of power; furthermore, these adjustments should be made when the engine is cold.

On account of the severe conditions under which the tractor engine must operate, improper vaporization of the fuel, partial condensation of the water which is injected, dust and dirt which reaches the com-



Where to Look for Trouble Is Also Given—Following This Are a Few Hints on the Cooling System and How to Adjust the Governor—Finally the Running Gear Assembly Adjustment and Repair Work Is Explained—The Writer Has Not Attempted to Give All Details and Cover All Tractors, Because Most of Them Are Very Much Alike, but Simply to Give Very completely



## ents and Repairs to Kerosene Tractors

should be made before tearing down the engine by removing the side cover plates or crankcase, and listening for the escape of gas between the piston rings and cylinder wall while some one is turning over the engine. Examination should be made after the engine has been running with everything in working order and properly lubricated.

Small piston leaks can be stopped somewhat by using a heavier grade of oil. Sometimes the leak is due to the aligning of the slots in the rings in a vertical line. This can be corrected by spacing the ends of the rings equidistant around the circumference. If the leak is very bad the rings should be replaced. When replacing rings, be sure that they fit in the groove of the piston so that they do not bind.

To fit oversize rings into grooves, drive nails into the bench equally spaced around the ring, so as to hold it firmly as shown at D in Fig. 1. Then with a wide flat file hold one end and with the other end move file back and forth. Continue to do this until the proper thickness has been reached. To test the thickness, simply place the ring in the groove and roll. Be sure and clean all the carbon out of the grooves before fitting the rings.

### Carbon Removing.

The best and most reliable method of removing the carbon from the cylinders is by scraping it out. Special tools for this work can be obtained, and for the repairman who wants to give complete satisfaction, scraping is the most satisfactory method. Compounds and burning cannot do the work as well, and besides they leave certain disagreeable after-effects.

### Bearings.

There is nothing so important as the taking up of engine bearings. Many tractor engines have been seriously damaged through carelessness on the part of the re-

pairman in adjusting or repairing them.

A hollow sound like a thud, every revolution, when the engine is pulling hard, is indication of a loose main bearing. A clattering, pounding, like the distant tapping of steel with a small hammer, twice every revolution and increasing with speed is indication of a loose connecting rod bearing. It is readily distinguished when the motor is idling or upon speeding up and suddenly closing throttle.

Some tractor crankcases have hand holes through which the caps on the upper side of the main bearings can be reached. In

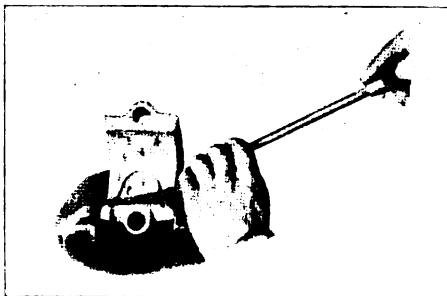


Fig. 2—Scraping the Bearing.

some cases filing and tightening these top caps will stop the knocking.

In other tractors the crankcase must be removed and the crankshaft and bearings exposed. If the bearings are worn out, new ones have to be fitted in and the job will require a good deal of time, care and proper scraping.

After scraping always determine whether you have the proper bearing surface by means of applying prussian blue to the bearing surface and rotating the shaft. Continue to do this, taking off a little at a time, as shown in Fig. 2, until the proper contact, as indicated by the even distribution of the coloring matter is made with the entire surface of the bearing.

After thoroughly cleaning and oiling, re-

place the crankshaft and check it for alignment. This is very important. Replace the caps and tighten, by removing the right amount of shims, until the crankshaft can just be turned with one hand.

When the bearing is badly burned out, the crankshaft journal may be cut or scored. If this is the case, wrap a piece of fine emery cloth soaked in oil around the journal and pass one turn of a strap around the emery cloth, then pull back and forth on the strap until the shaft is fairly smooth.

When the connecting-rod bearings become loose from wear and are not damaged otherwise, it is only necessary to tighten them, by removing the right number of shims, until the crankcase can be turned with one hand and there is no loose play, when lightly tapping the caps with a hammer.

If the bearing is damaged from lack of lubrication or neglected looseness, it will have to be scraped and the shaft smoothed, or if damaged seriously the bearing will have to be rebabbitted. When the bearings are excessively worn out of round and you want to scrape them to fit, first of all give the crankshaft journal a thin coat of prussian blue and determine the high spots. Then proceed as outlined for the main bearings.

### Ignition.

Ignition troubles may be divided into two main classes, sparkplug and cable troubles, and those due to the magneto; or if a battery ignition system is used, due to the coil or distributor or the primary circuit.

The most common ignition troubles were listed in the trouble chart last month.

Usually in the battery ignition system if there is no spark at the plugs and the vibrators buzz properly, the primary wiring is all right and the trouble is in the sec-

ondary circuit, or the sparkplugs themselves.

If there is no vibration at the coil, the trouble may be due to burnt or pitted vibrator contact points, broken timer wires or pitted vibrator contact points, vibrator out of adjustment, or poor connection at the commutator or timer.

If the points are pitted, file them flat with a fine double-faced file and by means of the adjusting nut turn them down so that when the spring is held down the gap between the points will be a trifle less than 1-32nd of an inch. Then set the lock nut.

In the magneto system perhaps the only thing that will cause failure of current generation, outside of slipping or broken driving connections, is brush trouble.

The commutator may become covered with an oil glaze or the brush holders may become fouled with old oil. Then, too, the brushes will wear in time, so that they no longer bear properly on the commutator and the current generated cannot be collected.

The contact points may be out of adjustment, worn or covered with oil. The contact points C in Fig. 3, should be so set that they are separated by a distance of about 1-64th of an inch when the lever is resting on any of the segments in the interrupter housing.

If the platinum points get dirty or covered with oil, take a piece of fine emery paper and clean them thoroughly. The timer should be oiled regularly by putting about three drops of oil in the hole marked "oil" and one drop in each of the three places marked "oil lightly."

If the breaker points fail to separate or when the distance is too great, adjust by means of screw D, Fig. 3. If the points have to be filed too often it is an indication that the condenser is not working properly. To find out take off breaker box cover and connect wire across from the nut that holds the clip to the pin on the insulating block in the breaker box, and operate the

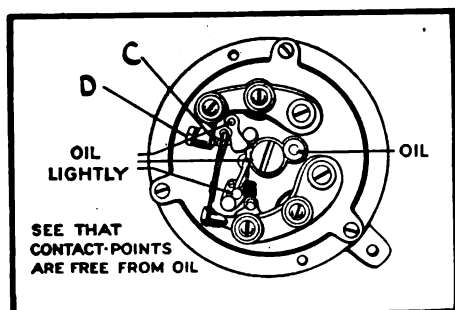


Fig. 3—Common Type Magneto Distributor.

magneto. If the condenser is bad, a considerable flash or spark between the breaker points will be found.

Whenever the magnets are removed be sure and place a keeper or piece of iron across the poles and leave it on until the magneto is replaced in position. In replacing the magnets they should be placed

so that they are not attracted but push each other apart.

The purpose of the impulse starter is to hold the magneto back against the tension of a spring until the motor is turned just

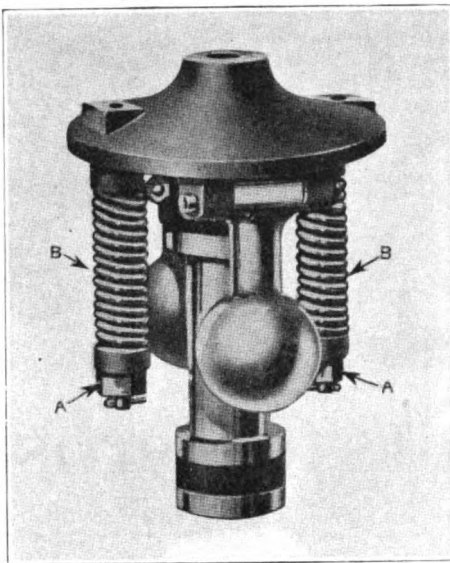


Fig. 4—Type of Governor on Tractor.

past the firing point, and then release it. The spring turns the magneto at top speed until it catches up with the motor, and a hot spark occurs when the points separate.

A small ratchet catch lock is located on the drive shaft end of the magneto and by means of an adjusting screw and lock nut, the catch lock may be made to engage the catch at the most suitable speed.

By pressing down on the extending end of the catch lock, the catch can be released for starting. The only attention the impulse starter needs is a good cleaning and oiling, especially when its action becomes sluggish and the motor won't start.

The ignition systems on tractor engines are like those used on automobile engines and the mechanic who knows automobile engine ignition will have no trouble in making adjustments or repairs.

#### Cooling System.

Next to lubrication, the cooling system requires special attention. When cleaning the radiator and jackets, drain the water and fill with a concentrated solution of six pounds of washing soda in five gallons of water. Allow it to stand for some time, then drain and flush thoroughly with clean water.

Examine the system thoroughly to make sure that there are no restrictions due to deteriorated hose or sediment, and repack the pump gland with graphited cord packing.

In some localities lime or iron accumulates in the jackets of the engine or sticks to the cylinder walls. To remove this scale drain water, plug pump connection and fill jacket, not radiator, with a solution made of one part hydrochloric (muriatic acid) of a specific gravity of 1.20 and three parts of water by volume. Leave the so-

lution in the jacket until scale loosens up, drain and flush with pure water for several minutes.

#### Governor.

The governor is put on the motor to control or govern the engine speed. It is so constructed that as the load increases and the engine tends to slow up, it will automatically open the throttle and thus maintain, as near as possible, a uniform, steady pull under varying load conditions.

The governor adjustment should not be tampered with unless it is defective. The governor will give next to no trouble if it is kept well oiled and if the control rods are of the right length. If the governor sticks, the engine will slow down and then speed up regularly, due to the tendency of the throttle to stick at either extreme.

A common type of governor found on tractor engines is shown in Fig. 4. In case it is necessary to change the speed of the engine, all that is necessary is to adjust the governor springs B, Fig. 4. To increase the speed tighten nut, A, on spring bolt, and to decrease speed loosen nut A, but be sure in either case that both springs have the same tension.

This method of adjusting the spring tension on the governor to change the speed of the motor applies to all throttling centrifugal governors. Aside from these adjustments, when an engine does not govern properly, the trouble is often due to undue friction in the mechanism from a lack of lubricating oil, change of weights, or when the spring tension is not uniform.

#### Running Gear Assembly.

The methods employed for transmitting the power from the engine to the traction members is very similar to the transmission used in motor cars and trucks.

Most of the tractors have clutches, transmissions, differentials, brakes, and steering mechanisms similar to those used in the running gear assembly of automobiles, and,

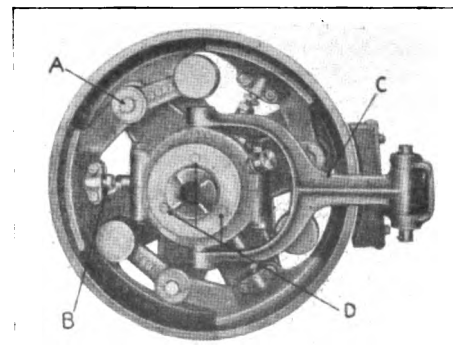


Fig. 5—The Avery Tractor Clutch.

with a few exceptions as pointed out, the repairs and adjustments are similar.

#### The Steering Mechanism.

The supporting pivot of the steering mechanism requires the most attention. This should be examined for play, should be well lubricated and free from dirt.

The steering knuckles and spindle bolts,

drag links, and tiebar should not have too much lost motion. The joints of the steering system should be enclosed in leather bags packed with grease, to protect them from dirt and keep them well lubricated. If these parts are not encased, call the owner's attention to the matter and obtain his permission to put the boots on. Steering chains should be carefully examined for loose or weak links.

#### Wheels and Brakes.

The wheel bearings should be taken out and cleaned in hot washing soda, packed with grease and adjusted tight enough so that there is no play when two diametrically opposed spokes are seized and the wheel rocked, when jacked up. Examine the spokes when making repairs and make certain that they are tight, for one loose spoke in a wheel will seriously reduce the strength of the assembly.

The important things to bear in mind when making repairs to brakes is to see that they are properly adjusted, take hold quickly and tightly, and that they do not drag. The brake lining should be examined, if worn to  $\frac{1}{8}$ -inch thickness or less it should be relined. If grease has worked onto the lining, distribute Fuller's earth over the surface, also examine brakes to make sure that all pins and fastenings are tight.

#### The Clutch.

The clutch should be examined to determine whether it is in proper condition and adjustment. A slipping clutch not only prevents the tractor from delivering its full power, but also quickly wears away the lining with which it is faced.

The construction of the clutch on the Avery tractor is very simple and a type which is used on quite a few of the tractors. An explanation of it will suffice for the rest of the same design.

To properly adjust this clutch, it is necessary that the bearing be evenly distributed to each of the arms. These arms hinge on a pin, *A*, Fig. 5, which should receive a drop of oil occasionally and are forced out against the rim of the band wheel by the toggle bolt, *B*.

To adjust the clutch, push the collar in

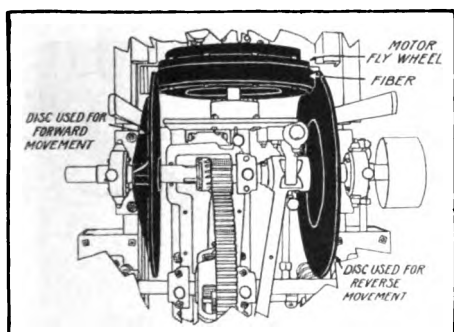


Fig. 6—The Friction Drive Transmission.

until it comes up against the side of the arms of the spider, and tighten the clutch by turning the bolts to the left until you cause a light strain on the arm, then tighten the lock nuts.

If the bolts are too tight, you will not be able to pull the clutch out; in this case, loosen them slightly. If the clutch does not hold to pull the tractor, tighten them, screwing each bolt a little until the proper adjustment is obtained. Never adjust

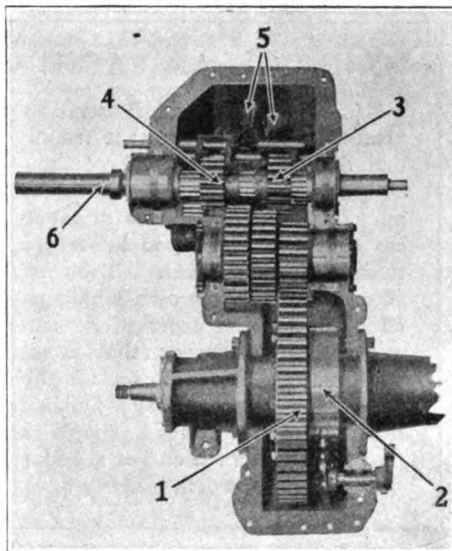


Fig. 7—Common Style of Transmission.

clutch arms so that the collar will not go clear in against the arms of the clutch.

The clutch may be removed from the shaft by removing the pin which will allow the clutch arm, *C*, to be removed. Taking out the three small bolts, *D*, will expose the keys which may be readily removed with a key puller, and the clutch pulled out and taken off very easily.

In the Heider tractor the power is transmitted by means of fibre wheels and two disks. The fibre is attached to the fly-wheel of the motor as shown in Fig. 6 and at no time should grease be allowed to collect on the fibre. Wash the fibre with gasoline, also wash the two disks. Then apply a little thresher hard oil to the fibre. This will prolong its life wonderfully. It is best to apply this with a piece of waste by holding it on the fibre while it is rotating so as to distribute it uniformly.

After standing idle for an hour, this grease will all disappear, penetrating the fibre. If it does not disappear, discontinue the practice of putting on grease until such time as the fibre is dry enough to take some more.

In case you get a surplus of grease on the fibre and slipping occurs, just hold the contact lever tight enough so that the motor keeps on turning, but not the disks. This friction will produce enough heat to burn the surplus grease off, true up the fibre, and make it hold better.

To remove the fibre, loosen the two  $\frac{5}{8}$ -inch cap screws underneath the motor which connect the arms and slide the motor as far forward as possible. Remove the ten bolts that hold the fibre wheel and drive it off. Then put new fibre on and

drive in place. In tightening the ten bolts, tighten each one a little at a time so as to get the same tension on all of them.

All automobile mechanics are familiar with the adjustments and repairs to the various disk and cone clutches and, consequently, there is no necessity of explaining these two types.

#### Transmission.

The gearing of a tractor does not give much trouble until the teeth become worn. If the teeth are burred, trouble will be experienced in shifting. Trouble in shifting may also be due to binding of the levers or rods because of accumulations of rust or dirt.

Grinding noises do not occur very often; when they do, something has gone wrong and should be remedied at once. The gears may grind or hum because they mesh too tightly, or cause a rattling noise due to loose bearings or from not meshing deep enough, especially when considerably worn. When replacing gears that have been removed for one reason or another, be sure that they mesh properly across the face: that is, the entire face of one gear should mesh with the entire face of the other, because if they are not properly meshed, the area of contact is decreased and the load per unit area increased and stripping of teeth will result.

One style of transmission used on the Waterloo Boy tractor, is shown in Fig. 7. No. 1 is the differential; No. 2, the brake in differential hub; No. 3, high speed pinion; No. 4, low-speed pinion; No. 5, gear shift levers; and No. 6, engine extension shaft. The adjustments and repairs to this style of transmission are the same as those to an automobile transmission.

The method used to transmit the power in the Beeman tractor is unique in that the transmission is made of three principal parts, and acts as a transmission, differential, and clutch.

The transmission shaft *B*—193, as shown in Fig. 8, is made up of two pieces and

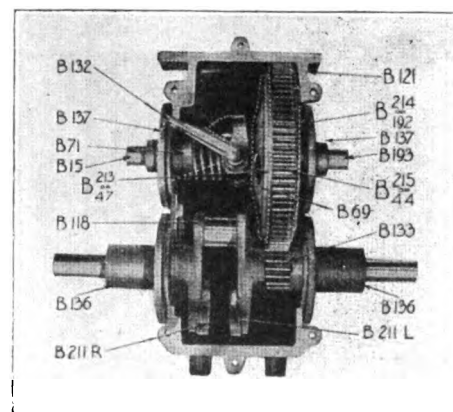


Fig. 8—Combined Transmission.

so held together that they do not come apart and act as a differential when the clutch is released. When the clutch is let in or engaged, the shaft is locked, and

(Concluded on page 50.)

# Practical Hints for Shop Mechanics

Conducted by E. C. Pohlmann

## Babbitt Metal.

If you want to improve babbitt metal and make it run better, put a piece of rosin about the size of a walnut into the molten metal, stir it thoroughly and then skim.

With the rosin in, babbitt metal will run into places where without it, it would not. Rosin also prevents blowing when pouring it into damp boxes.

\* \* \*

## Removing Heavy Wheels.

Frequently a mechanic will find it necessary to remove the wheel of a heavy truck, and will find the task a difficult one unless he has equipment to meet such an emergency.

Jack the wheel that is to be removed about an inch and elevate the other side of the truck five or six inches, then grease the floor underneath the wheel to be removed. It will surprise you to find out that the wheel will slide off with very little, if any, difficulty.

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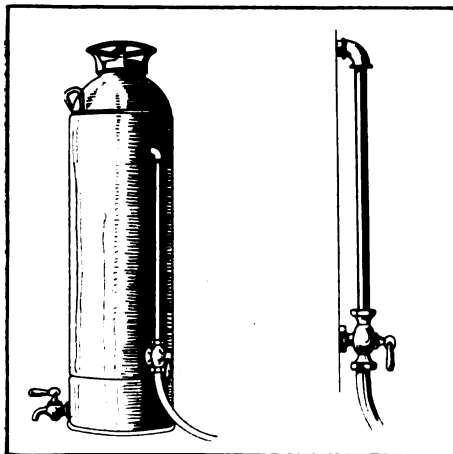
## Tinning Surfaces.

To cover articles of brass or copper, boil them in a solution of cyanide of potassium mixed with turnings or scraps of tin. It only takes a few minutes to cover them with a firmly attached layer of fine tin.—M. C., Wyo.

\* \* \*

## Carbureter Mileage Tester.

A repair shop that is called upon to do a considerable amount of carbureter work must use some sort of a tank for the purpose of testing the mileage obtained per gallon of gasoline. A device of this kind can be made of an old fire extinguisher, the



Tank for Obtaining Car Mileage.

cap of which will serve for filling. At one side and near the top of the tank, drill a  $\frac{1}{8}$ -inch hole, and another beneath it and near the bottom. Into these holes are screwed  $\frac{1}{8}$ -inch nipples, which

## ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical. Tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction, a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

should have short elbows between which is placed an ordinary glass gauge.

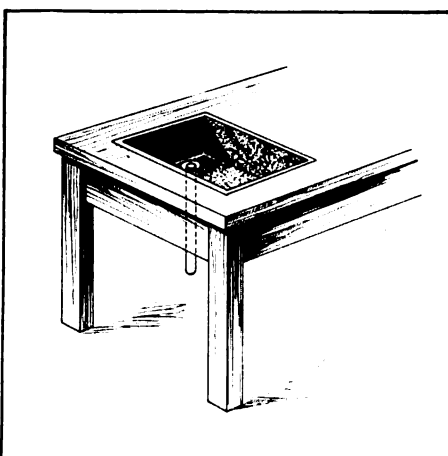
From the illustration it will be noted that two petcocks are used, one as a drain and the other at the lower end of the gage for the purpose of shutting off the supply of fuel. The tank can be carried in the front seating space and with rubber tubing can be connected to the carbureter.

\* \* \*

## Cleaning Sink and Workbench.

It occasionally happens that there is not enough space in a small shop to include in its equipment both a cleaning sink and a workbench, either of which is indispensable.

In this case it is an easy matter to combine the two by building into one end of the bench a sink, which should be made of sheet metal and provided with a drain



A Cleaning Sink in Workbench.

plug. The sink should be filled with kerosene every day. In the morning drain the fluid which is allowed to settle during the night, and the remainder will be found clean enough to be used again.—G. C., Ill.

## Making Good Oil.

Take a bottle about half full of good olive oil and put in thin strips of sheet lead. Expose it to the sun for a month, then pour off the clear oil. This is a very cheap way of making first-class oil for light machinery such as is used in the distributor or generator.—J. N., Wis.

\* \* \*

## Shop Instruction Book.

In order that efficient work may be turned out in a shop, it is essential to have instruction books for reference. When used in the ordinary way they are bound soon to become soiled to an extent that they are useless. This can be prevented by mounting the pages on heavy cardboards and hanging them on a wall. Since each page of the book is printed, it will be necessary to utilize two books. As a further protection, apply a coat of varnish over the surface.

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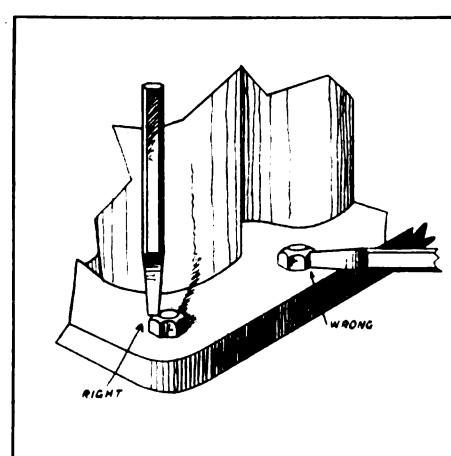
## Cleaning the Muffler.

In cleaning the muffler, after it has been taken apart and cleaned with kerosene, it is well to go over all the holes designed to break up the gas with a sharp punch or fine taper reamer, to make sure that these holes have not been reduced in size by accumulations of burned oil or carbon.—P. M., Va.

\* \* \*

## Splitting Nuts.

It may seem too everyday and simple, but nevertheless I have seen several mechanics split nuts the wrong way, so I am passing this hint along for what it is worth.



Right and Wrong Way of Splitting Nut.

When splitting nuts, always split them in a direction parallel to the length of the bolt, as shown in the accompanying illustration, and never perpendicular to it.—M. R., N. Y.



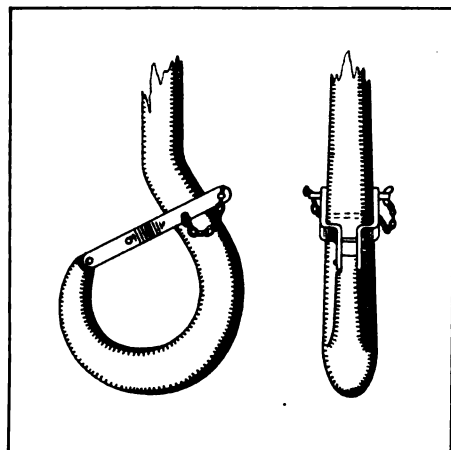
### Improper Use of Reamers

Never use a reamer to ream out a pipe of any kind. The scale inside of the pipe caused by the flux used in welding or brazing is as hard as glass, and no reamer can be made hard enough to cut it.—D. F.

\* \* \*

### Safety for Hoist Hook.

A simple safety device for a hoist hook can be made as shown in the accompanying



Safety Device for Hoist Hook.

ing illustration from any kind of  $\frac{1}{8}$ -inch by  $\frac{1}{2}$ - or  $\frac{3}{4}$ -inch flat iron.

It is best to attach the pin by means of a chain, to the device itself, because I have found that it becomes very easily misplaced and lost and can't be found when needed.—M. P. B., N. Y.

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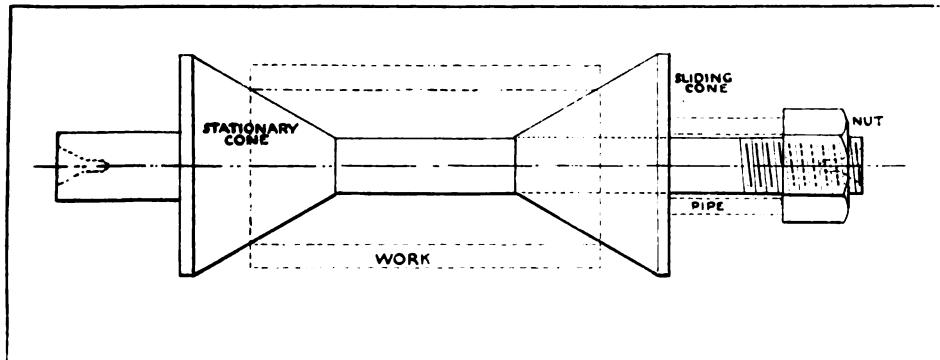
### To Remove Ford Engine.

Should it be desired, the removing of a Ford motor from the frame without lifting the front of the body can be done by cutting out with a hacksaw a square 1 in. by 1 in. on each side of the dash and directly over the frame.—C. S.

\* \* \*

### To Distill Water.

Distilled water for the storage battery can be made by means of a simple appara-



Special Adjustable Tool for Turning Bushings.

tus. Have a length of annealed copper tubing coiled so that it will fit in a dishpan. Connect the end of the copper tubing with an ordinary teakettle by means of a short piece of rubber tubing attached to the

spout. The other end of the copper tube is curved so that the water passing down will drip into a bottle or other container. The dishpan in which the coil rests is filled with cold water, frequently renewed to keep it cold.

The water in the teakettle is boiled and the steam so produced passed out of the spout into the tube, through the coil, where it is cooled and condensed back into water again, and is finally collected for use in the bottle at the end of the copper tube.—F. P., Mich.

\* \* \*

### Stronger Glue.

If you want to make common glue much stronger, add a little powdered chalk. A glue that will resist the action of water may be made by using skimmed milk instead of water.—C. S., Ind.

\* \* \*

### Testing Solder.

In an emergency, when you need solder and cannot buy it in a hurry, melt equal parts by weight of tin and lead, stir it and run it off into a mold to cool.

To test solder and find out whether it is of good quality, hold it up near the ear and bend it. If it cringes or makes a crackling noise, it is good; if not, it is poor—too much lead and not enough tin in it.—R. H., Minn.

\* \* \*

### Remove Bushings.

A tool for removing steering spindle bushings may be made from a piece of  $\frac{3}{8}$ -inch round steel, which should be bent slightly about two inches from the end.

The tool will have to be long enough to pass through the steering knuckle and leave an inch or two sticking out, on which to hammer.—R. J., Ala.

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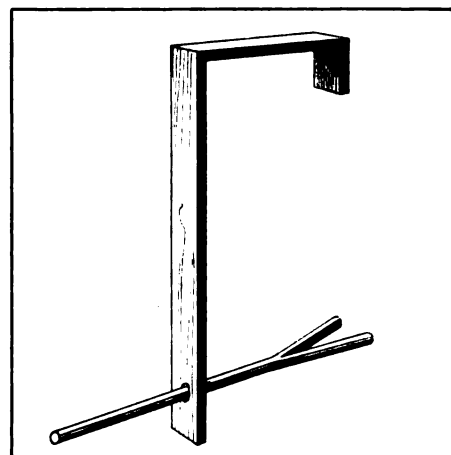
### Lathe Tool.

A very good lathe tool which can be used for turning down any size bushing, can be made from a piece of round iron as shown in the accompanying illustration. The sliding cone is made from a separate piece of

### Handy Valve-Spring Lifter.

The majority of valve-spring lifters on the market today are not very good; at least, I have never been able to buy one that will do the work as well as the one described below. It can be made quickly and inexpensively.

Take a piece of strap iron about  $\frac{1}{4}$ -inch thick and one inch wide and bend the iron into the shape shown in the illustration.



Simple Valve-Spring Lifter.

Then take a piece of  $\frac{3}{8}$ -inch round iron and make a fork at one end of it.

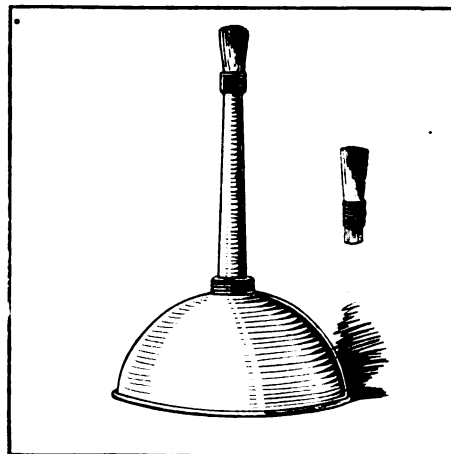
This valve lifter can be made adjustable by splicing the part marked B, so that it can be set to different widths of cylinder blocks and held in place by means of a bolt.—J. L., Ill.

\* \* \*

### Using Oil Can for Flux.

An old oil can can be very satisfactorily utilized for holding and especially for spreading soldering flux by taking the bristles from an old brush, binding them together and then forcing them into the spout of the oil can.

The bristles can be fastened together with string and after being inserted in the



Utilizing Oil Can for Soldering Flux.

spout can be held tightly by hammering the end of the spout to a taper.

To use the flux all you have to do is use the can as you would when lubricating any plane surface.—G. S., Ill.

# Must Workman Submit to Operation?

Approach to the Sanderson Garage Was One Glare of Ice—Peterson Started Out with Some Oil, Slipped, Fell, and Was Injured—Minor Operation Necessary—He Refused and Insurance Company Limited Compensation

By Chesla C. Sherlock

It was one of those mild days in late winter, when the sun shines brightly and people commence to look forward eagerly to the coming of spring.

The snow had been going a little at a time for several days, but a sudden cold snap each evening had prolonged the thawing process. Where the snow had melted, it turned to ice. There was a lot of it around town, especially on the sidewalks and drives.

The approach to the Sanderson garage was one solid glare of ice. Sanderson had ordered the colored boy, who did odd jobs around the place, to cover that approach with ashes, but that "worthy" had become absorbed in a "seven come eleven" game back under the stairs with another of his race, and had forgotten all about the front drive.

Early in the morning, a customer drove up to the front of the garage, and asked for a quart of light oil. John Peterson, a genial Swede who had had not been in Sanderson's employ very long, started out with the measure of oil in his hand. When he stepped on the icy place, he executed one high dive and landed on his shoulder blade, spilling the oil all over the street.

Some of the boys, who happened to see the exhibition of gymnastics, which Peterson staged, laughed themselves hoarse. Sanderson also saw it, but to the big, jovial garage owner it was far from being a laughing matter. He had fallen that way once himself.

He hustled out into the street, not forgetting to put on his rubbers before he went, and gathered Peterson up in his arms. The latter was making a game show of it, but it didn't take a mind reader to see that he was hurt. He held his arm clamped to his side and walked in a stooped position.

"Guess I fixed myself that time!" he muttered, grimly, his teeth chattering with the shock of it. "Hurts down here—like the devil!"

Sanderson led him to the office, where he had an old lounge and sent the colored boy after the doctor. "Get a move on, too!" he snapped.

In half an hour, the doctor arrived. He made his try at absurd pleasantries, as medical men are prone to do when someone is in dire suffering, then sobered and went to work. After a few minutes' examination, he readily determined the cause of Peterson's pain.

"Severe hernia," he said, shaking his head, gravely. "One of the clearest-cut cases of traumatic hernia I

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## Safety First!

The extent of your duty to yourself and your workmen does not end with the taking out of insurance; this is only a precaution against the unforeseen, the "liable to happen" in spite of all your carefulness. But you should every day be on the watch, and use common-sense care. Adopt the slogan of Safety First, and carry it out to the full extent of its meaning, by guarding moving parts on machinery, enforcing the use of goggles when grinding and chipping, periodically inspecting all hoists and overhead equipment, guarding health against inclinations of the weather, and garage or shop conditions, and above all by posting a few safety-first cards at the entrance to your garage and in the shop.

The casualty list of industrial accidents and deaths in this country resembles the casualty list of a nation engaged in war, rather than that of people engaged in peaceful pursuits.

The loss of time, the decreased efficiency, the expenditures for medical care, the results of such injuries, and the curtailment of production imposes a heavy burden on the people. This burden can be lightened by observing the simple rule of Safety First!

---

ever saw. It's seldom, indeed, that an external physical injury can tear down the abdominal walls, as happened in this case.

"There is only one thing to do and that is to operate. The sooner he is operated on, the less the pain and the less the danger. Hernia operations are not serious, and it is a hundred to one bet that he'll be back to work in ten weeks, as strong as ever, if he

has the operation now. The longer he delays, the greater the risk, and the more pain. One thing is certain—hernia will not cure itself, and it can cause one a lot of pain and a lot of inconvenience."

He snapped shut his medicine case, and put on his coat.

Sanderson looked down at Peterson.

"You heard what Doc said. Shall we take you up to the hospital? Of course, you know the bill will be paid by the insurance company, and your compensation as well."

Peterson was unwilling to submit to the operation. His father, his brother and a relative by marriage, had died on the operating table. He had heard doctors talk about the chances of coming through an operation, but he had no faith whatever in what they said.

"You can take me home," he said. "I won't have anything to do with an operation!"

They took him home. He didn't get much better, although, after awhile, he was able to get around a little with the aid of a truss.

Sanderson had, as usual, promptly put in a claim with his insurance carrier. In the course of time, he received a letter from the company, which read:

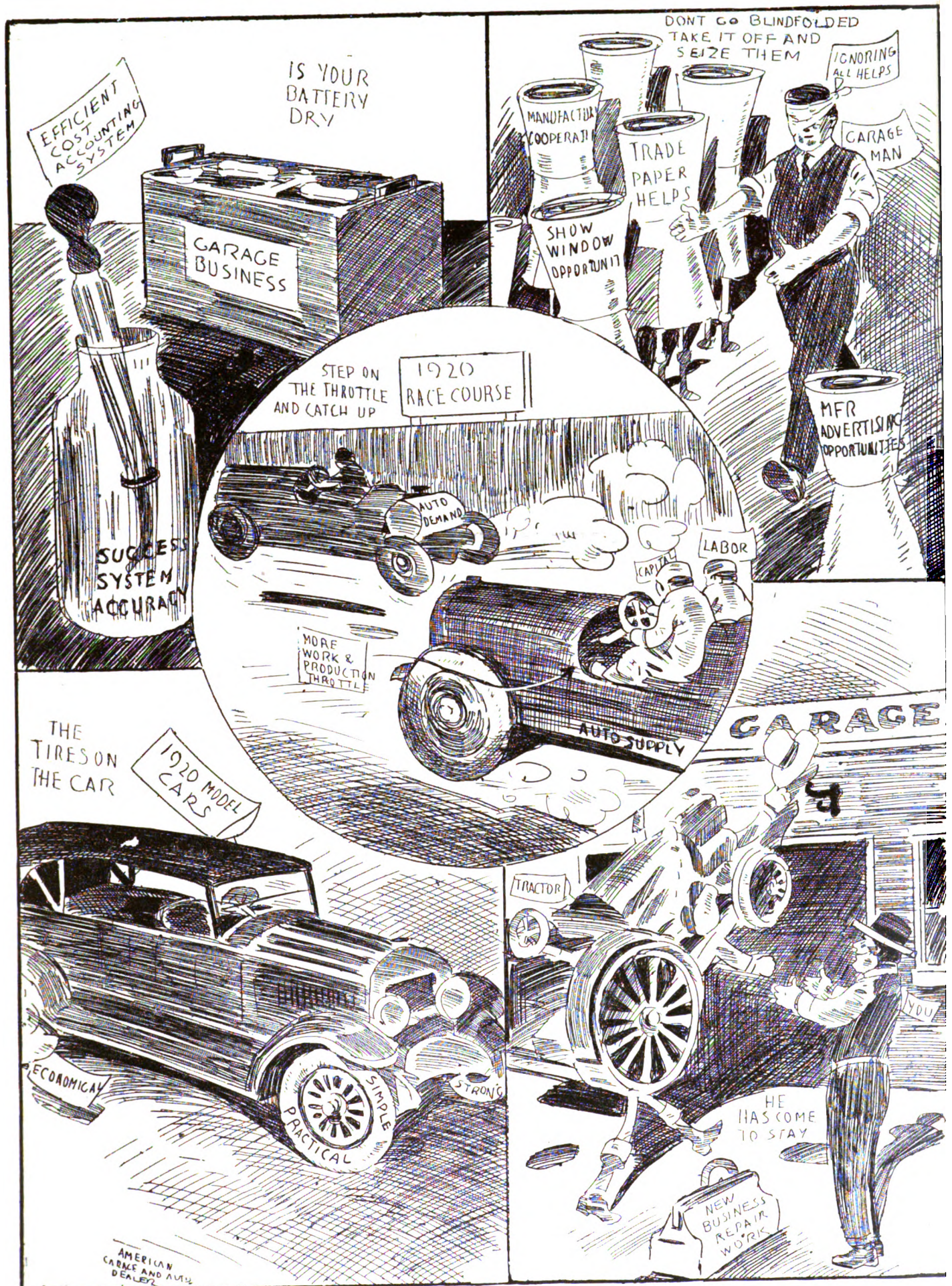
"Enclosed please find check for first-aid treatment furnished John Peterson. Beyond this, we must decline any further liability in his case. He should have submitted to an operation.

"Had he done so, his probable period of disability would have been about ten weeks' incapacity. As it is, his partial incapacity will prove to be indefinite, and we have no way of knowing just how long it will last, it all depends on how long he lives.

"An operation to correct a hernia is not a serious operation, and the courts have specifically held that it is the duty of the injured to submit to an operation. If he does not do this, then the company's liability is terminated by the tender of compensation

(Concluded on page 46.)







# Accounting:

In This Issue the Purpose and Method of Using the Purchase Journal Is Explained—The Purchase Journal Is the Book Which Contains Daily Record of All Purchases—Sample Entries Posted to Purchase Journal Are Shown—Readers Urged to Send Copies of Invoices for Posting

By J. Newton Boddy

Mgr. System and Loose-Leaf Dept., Jeffrey & McPherson Co., Minneapolis.

The purchase journal is the book which contains the daily record for all purchases. It is an elaborate form of invoice register. It is not thought advisable for the average garageman to post an invoice before the merchan-

This method of handling expense bills simplifies filing, as the expense bills are filed under the name of the transportation company instead of with the invoices. Invoices may be filed either alphabetically or numer-

nals. This method, antiquated and distressingly slow, destroys the internal check so necessary to modern methods.

In posting an invoice to the purchase journal, be sure to give enough

PURCHASE JOURNAL													
MONTH November 1919													
DAY	ITEM	MEMO	ACCOUNTS PAYABLE CREDIT	PETTY CASH CREDIT	MISCELLANEOUS ACCOUNT	CREDIT	EXPENSE ACCOUNT	DEBIT	WAR TAX DEBIT	MISCELLANEOUS ACCOUNT	DEBIT	MERCHANDISE DEBIT INVOICE	CARRIAGE
3	Chevrolet Motor Co.	986	1100.00						50.00			1050.00	
	M. C. Rd.	987	70.00										70.00
	The Auto Parts Sales Co.	988	150.00						3.00			147.00	
	American Express	989	6.50										6.50
	The Sinclair Oil Co.	990	86.50									86.50	
	John Smith Rent	991	50.00				General	50.00					
	The Alling Co.	992	15.00				General	15.00					
	American Surety Co.	993	30.00				Sales	30.00					
	The Daily Tribune	994	40.00				Sales	40.00					
	Auto Show Expenses	995		7.60			Sales	7.60					
	Burroughs Adding Mach. Co.	996			Notes Pay.	350.00				Office F. & F.	350.00		
	Reliance Machinery Co.	997	400.00							Shop Equip.	400.00		
		998											
		999											
		1000											
		1001											
		1002											
		1003											
		1004											
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		1013											
		1014											
		1015											
		1016											
		1017											
		1018											
		1019											
		1020											
	TOTAL PAGE		1948.00	7.60		350.00		142.60	53.00		750.00	1283.50	76.50
	TOTAL FORWARD												
	TOTAL DATE												

Purchase Journal Sheet Showing Entries of Sales as Enumerated in the Text.

dise is received. Stamp each invoice as received. This stamp should provide for the following:

Date Received .....  
 Carrier .....  
 Expense Bill No. ....  
 Weight.... Rate.... Amount....  
 Over..... Short.....  
 O. K. ....  
 Distribution .....  
 Purchase Journal .....  
 Purchase Ledger .....  
 Stock Ledger .....

ically. The numerical method permits of speedier filing for ready reference.

The invoice should never be filed until it is posted to all the subsidiary records. Postings to the purchase or accounts payable ledger should always be made from the invoice. The majority of bookkeepers post their ledgers from the cash book or jour-

details in the item column to again identify it. Of course, if you number your invoices, you can have your memo. column of the journal numbered and number the invoice as you enter it. This is the simplest method of identification. If you do not do this, it is a good plan to show in the memo. column either the date of the invoice, the vendors' invoice number,



or your purchase order number. Remember the date of entry will be the date received, not the date of the invoice, nor the date the invoice was received.

ACCOUNTS PAYABLE CREDIT: Let me suggest here that for the average garageman I consider an accounts payable ledger just as important as an accounts receivable ledger. It is just as logical to carry your accounts receivable on sales tickets as to carry accounts payable on the vendors' sales tickets or invoices. For the same

period, we still credit accounts payable. We do not open up accounts in the accounts payable ledger for any of these vendors, but carry them all under one account, "cash purchases." Where we use the petty cash for purchases, we credit the petty cash account in the purchase journal.

MISCELLANEOUS, OR ALL OTHER ACCOUNTS: These are sundry inactive accounts of the purchase journal which appear in the general ledger, such as "accounts receivable," "notes payable," "furniture and fixtures,"

at times you may be obliged to make an exception by special request: "I don't want the accounts mixed up. Send me a check for mine and I will send you a check for yours." In such cases, an extra account on your books will make no great difference and avoid the suggestion of criticism of your friend's business methods.

Notes payable will seldom be credited except in the cases of purchase of office appliances, or shop equipment. Adding machines, cash registers, lathes, cutters, vulcanizing outfits, etc.,

[illegible]

**The Other Half of Purchase Journal Sheet Showing Detailed Record of Sales as Enumerated in the Text.**

reason I always discourage the use of voucher registers except for a few lines of business. I certainly would advise against the voucher system for the garage business.

Accounts payable is credited with all purchases on open account, or for cash other than petty cash. When merchandise is purchased C. O. D., cash with order, or cash in discount

"pay roll," etc. The most active of these is, of course, "accounts receivable" or "contra accounts," as they are sometimes called.

Unless the volume of business transacted on both sides is considerable, I always avoid contra accounts. It is either "accounts receivable" or "accounts payable," according to where the balance usually shows. Of course,

are often sold on notes. Pay roll, furniture and fixtures and other sundry general ledger accounts, are so seldom involved in our purchases, that we need not discuss them at this time.

**EXPENSE DEBIT:** Many of your invoices will be for expense items such as office supplies, shop supplies, out-

*(Concluded on page 42.)*

# Readers' Questions and Answers

Conducted by E. C. Pohlmann

## Repairing Scored Cylinders.

In your magazine of November, 1918, under the heading "Welding, Cutting and Brazing Practice," there appeared an article concerning the repairing of scored automobile cylinders.

We would like to try this method, but are unable to find a place where we can procure the silver solder necessary in order to do this work. Please inform us where we can obtain this solder.—O. O.

The process of repairing scored cylinders with silver solder is patented. This was unknown at the time the article was written, therefore, we believe it would be the best policy for you to write to the owners of the patent, L. Lawrence & Co., Woolworth building, New York City, and make arrangements whereby the process can be used or the company will probably furnish you with the prepared solder.

However, if you care to try it, you can make a substitute solder of lead, tin and zinc in the following proportions, 60 per cent lead, 38 per cent tin and 2 per cent zinc. We cannot guarantee results with this substitute solder.

\* \* \*

## Gasolene Line Repair.

I am frequently called upon to repair gasolene pipe lines and would like to ask your opinion if it is advisable to fix a lengthwise and a transverse break by the same method; that is, by fitting a copper sleeve?—J. S., Ill.

It is very true that gasolene pipe-line trouble occurs frequently and, unless the driver is enough of a mechanic to perform an emergency repair, the chances are he will find it necessary to be towed in. A very simple emergency method in such a case is the application of ordinary soap, held in place by tire tape. The permanent repair of a lengthwise crack can be made by binding the pipe with copper wire and then soldering the pipe and wire into a unit. A transverse break, however, can be repaired, as you suggest, with a copper sleeve, slightly larger than the tubing.

\* \* \*

## Firing Orders.

Would you be kind enough to publish the firing orders of the following cars:

1. 1915 Apperson
2. 1912 Chevrolet Six.
3. 1914 Chalmers Four.
4. Enger Six.
5. 1917 Marion-Handley.
6. Ross Eight.
7. 1917 Homer-Laughlin.—G. S., Ill.

1. The firing order is: 1-5-3-6-2-4. Extreme retard, dead center; maximum advance 15 degrees.

2. The firing order is: 1-4-2-6-3-5

3. The firing order is: 1-3-4-2. Mag-

neto setting; extreme retard, dead center.

4. The firing order is: 1-5-3-6-2-4.

5. The firing order is: 1-5-3-6-4-2

6. The firing order is: 1R-2L-5R-6L-7R-8L-3R-4L. Battery ignition.

7. The firing order is: 1-6-3-5-4-7-2-8. Magneto setting point, approximately 5 degrees after piston passes upper dead center; maximum advance about 30 degrees.

\* \* \*

## Thread Compound.

Please tell me how to make a good "dope" for screw joints, especially for valve caps and exhaust pipes.—T. E. C.

A good lubricant or "dope" for the screwed joints can be made by taking one part of white lead, one part of black lead or powdered graphite, and four or five

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**Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.**

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by in, back it out one turn and tighten.

---

parts of machine oil to mix it to a fluid consistency. To a pint of the mixture, add about one teaspoonful of flour emery and mix thoroughly.

When using this mixture, put a small quantity inside of the fitting and an equal amount on the thread to be screwed in. After the piece has nearly been screwed in, back it out for one turn and then tighten.

The flour emery polishes the thread, especially when the pipe is turned backwards, and tends to make practically a ground joint.

\* \* \*

## Transmission Trouble.

I have several times been called upon by a customer to eliminate a grinding noise in the operation of the transmission gears of a four-cylinder Buick. I have taken pains to make sure that they are properly adjusted and that the meshing is correct, but the noise is just as bad as ever. If you

would kindly suggest in your next issue anything that would help me, I would surely appreciate it.—L. B., Ind.

The trouble you refer to is quite common, though a grinding noise is more often noticed in bevel than in spur gears. It is also common in old transmission and on lower speeds. In case of old gears, after making sure of correct adjustment and meshing, try the use of a thicker lubricant. In case you have been using a thick oil, we would suggest a change to equal parts of oil and grease, or even all grease.

It is just possible that the shaft may be out of alignment. This can be caused by an improper setting, by worn bearings or by a crack in the case, any one of which will cause a noise. If properly set at one end and out at the other, the trouble is not so easily remedied.

If the car in question is an old one, and the owner has been negligent in proper lubrication, the resultant heating will cause trouble. To correct this trouble, use a thicker grease so the gears will cut it better, make it thinner so they will splash it more, or, if necessary, change the nature of it entirely.

\* \* \*

## Otto and Diesel Cycles.

A young man whom I employ in my repair shop as a helper, asked me why they call the operation of the automobile engine "the Otto cycle," and what it means. He also wanted to know why they call a different kind of an engine about which he read in another magazine, a "Diesel engine."

I tried to explain it to him, but could not make it very clear. Will you please publish an explanation? Perhaps there are others who would like this information.—J. L., Penn.

The operation of the automobile engine, or more correctly the cycle, is called the Otto cycle because it was first embodied in 1862, in the design of a motor by a man named Otto.

The Diesel engine is named after Rudolph Diesel, who in 1898 built an engine on the principle of gradual and quiet combustion as opposed to explosion.

A cycle as herein used is meant a repetition of certain operations, and, in the case of the Otto gas engine, the cycle has five operations:

1. The explosive mixture is drawn into the cylinder. This is represented graphically by plotting the values of volumes against the pressures. In this case the pressure remains theoretically constant, and as the piston moves downward, the volume increases. This operation is represented by AB in the accompanying diagram marked Otto.

2. After the charge is drawn in, the valves close and the mixture is compressed. During this compression the volume decreases, but the pressure increases. This operation is represented by *BC*. This compression is known as adiabatic because theoretically there is no heat entering or leaving the charge.

3. After the charge is compressed it is ignited. This causes a rapid burning or explosion and the temperature and pressure rises. Theoretically, the pressure rise is instantaneous and takes place without a change in volume as shown by *CD*.

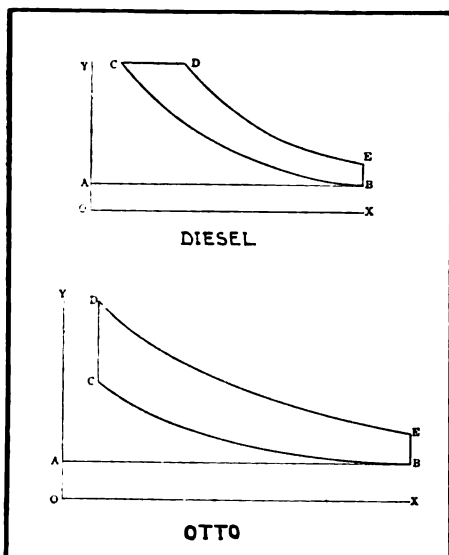
4. On the power stroke the gases expand and the pressure decreases, as shown by *DE*. This is known as adiabatic expansion because theoretically no heat enters or leaves the charge.

5. On the exhaust stroke the burned gases are expelled in part, and theoretically at constant volume. This is shown by *EB*. After these five operations are completed, they are repeated.

Remember, however, that the graphical representation here shown of the Otto cycle is the theoretical. Actually, the explosive mixture is drawn in at slightly less than atmospheric pressure and during compression some of the heat is dissipated by the cooling water, so that the operation is not purely adiabatic. Besides, the charge is not ignited on dead center, neither is the pressure rise instantaneous. During expansion, heat is carried away from the charge by the cooling water and hence the operation is not purely adiabatic.

In the Diesel engine we also have a cycle of five operations, but these are somewhat different.

1. The air without fuel is drawn into the cylinder as shown by *AB* in the accompanying diagram marked Diesel.



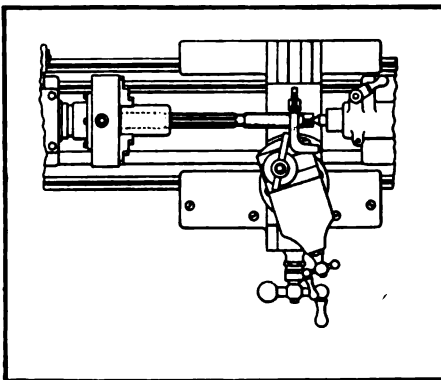
Theoretical Otto and Diesel Cycles.

companion diagram marked Diesel.

2. The air is then compressed adiabatically to approximately 500 pounds per square inch. This is shown by *BC*.

3. At the end of compression the tem-

perature of the air is higher than the ignition temperature of the fuel, and consequently when the fuel is injected it at once burns. By proper regulation of the fuel it may be made to expand at practically



Method of Using Reamer in Lathe.

constant pressure, as shown by *CD*, or constant temperature.

4. On the power stroke the charge expands adiabatically, as shown by *DE*.

5. On the exhaust stroke the burned gases are expelled in part, as shown by *EB*.

The Diesel cycle resembles the Otto cycle except that the combustion takes place at constant pressure rather than at constant volume.

\* \* \*

### Using Reamer.

Please tell me how a reamer can be used in the lathe so that it will not draw or bite.—S. B., Ind.

In order to prevent a reamer from drawing or biting, attach a dog to the reamer, place the end of the reamer on the tail center and with a tool in the tool post feed the compound rest up so that the dog will be supported by the top of the rest. The reamer is held back on the center by the tool post which presses against the dog. This can be more clearly understood by referring to the accompanying illustration.

Start the lathe and feed the reamer into the work by the aid of the tail stock wheel. The reamer will now feed evenly and drive the carriage before it, and the weight of the carriage will prevent the reamer from gripping.

\* \* \*

### Hudson Data.

1. Who originated the idea used in the Hudson super-six motor?
2. Have not the principles used in the Hudson motor been used to some extent in racing motors?
3. What were the gear ratios used on the Hudson at Sheepshead Bay?—A. R., Ill.

1. The engineers of the Hudson Co.
2. The Hudson company claims an entirely new principle of balancing.
3. For the speed tests, 3½ to 1; for the acceleration tests, 4 5/11 to 1.

### How to Figure Horsepower.

1. How many different formulae are there for figuring the horsepower of an engine.
2. How is the horsepower calculated from the bore and stroke?—S. B., Fla.

1 The following formulae are in use:

$$\text{H.P.} = \frac{(\text{Bore})^2 \times \text{No. Cyl.}}{2.5}$$

This is the S. A. E. formula for calculating the horsepower of an engine.

The McCullough formula for calculating the horsepower is as follows:

$$\text{H.P.} = 0.4 \times (\text{Bore})^2 \times \text{No. Cyl.}$$

There is another formula, in use, the author of which is not known:

$$\text{H.P.} = \frac{D^2 \times N \times L \times R}{C}$$

In this formula, *D* is equal to the bore, *N* is the number of cylinders, *L* is the length of the stroke, *R* is equal to the number of revolutions per minute of the crank shaft, and *C* is a constant.

The constant, *C*, for four-cycle engines is 13,000; for two-cycle engines it is 10,000.

2. The horsepower can be calculated from the last formula, namely:

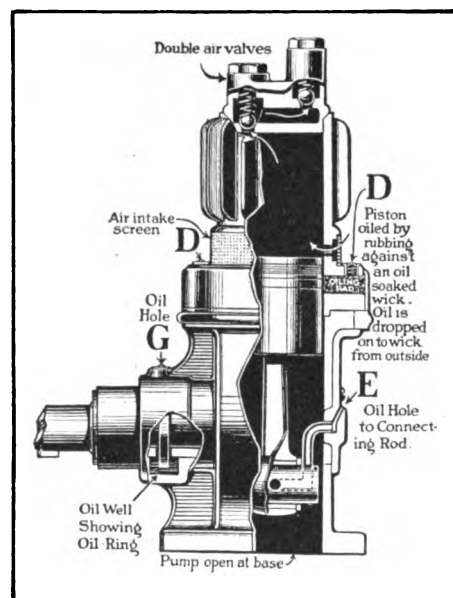
$$\text{H.P.} = \frac{D^2 \times N \times L \times R}{C}$$

Take *R* equal to 1,000 or 1,200 r. p. m., and *C* equal to 13,000 if for a four-cycle engine.

\* \* \*

### Tire Pump Operation.

The Stewart tire pump on a Jeffrey car won't pump to pressures more than about 40 pounds. What do you think is the trouble? What attention should this pump receive?—J. G., N. Y.



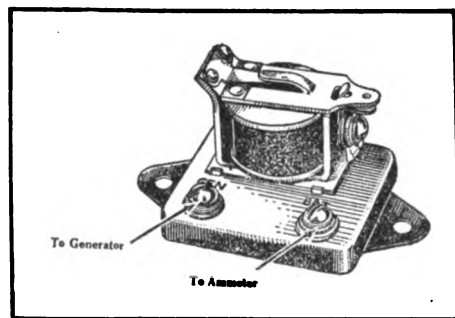
Construction of Stewart Tire Pump.

The trouble is probably due to worn piston rings, or weak or broken springs on air valves.

The only attention this pump should receive is proper lubrication. The piston re-

quires very little oil, and too much oil is bad for it. Only about ten drops of oil should be put in the oilers, *D, D* (see illustration), for every tire inflated.

After every four or five inflations, fill



Willys-Knight Circuit Breaker.

the oil-ring chamber, *G*, with good lubricating oil.

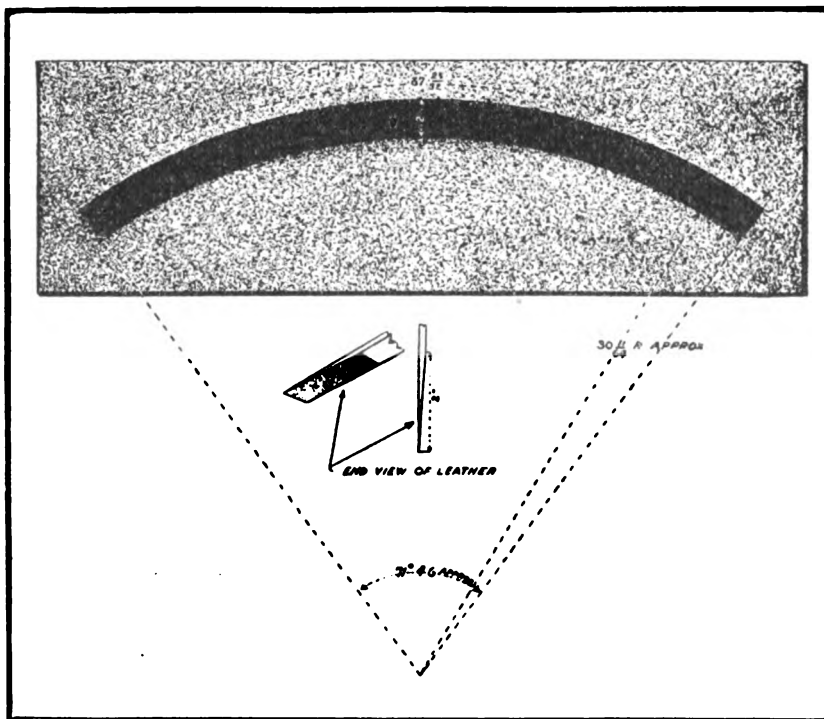
Oil connecting rod at *E*, until hole fills up. When filling, have piston in down-stroke position. Oil connecting rod every time tire is inflated.

\* \* \*

#### Overland 4 Data.

Please give me the following information concerning the Overland 4:

1. Wheelbase?
2. Bore and stroke of motor?
3. Kind of transmission?
4. Kind of cooling system?
5. Kind of ignition?
6. Capacity of cooling system?
7. Make of electric system?
8. Capacity of gasoline tank?
9. Kind of clutch?
10. Size of tires?
11. Weight of car?—F. H., N. C.



Pattern for Cutting Clutch Facing.

1. The wheelbase is 100 inches.
2. Bore is  $3\frac{3}{8}$  inches, stroke is 4 inches.
3. Selective sliding gear type; three speeds forward, and reverse.
4. Thermo-syphon.

5. Battery and distributor system, with automatic cut-out.

6.  $3\frac{3}{4}$  gallons.

7. Auto-Lite two-unit, six-volt starting and lighting system. U. S. L. battery.

8. 10 gallons, tank in dash.

9. Single-plate, running in oil.

10.  $30 \times 3\frac{1}{2}$  inches.

11. Approximately 1825 pounds.

\* \* \*

#### Circuit Breaker and Clutch.

1. The Willys-Knight model 88, four cylinder car is equipped with a circuit breaker. What is the purpose of a circuit breaker and what attention or care should it receive?

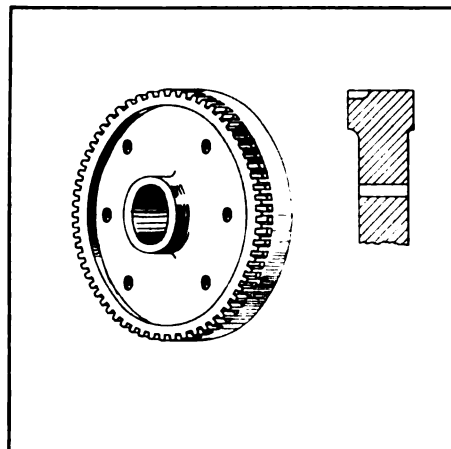
2. If no clutch leather can be obtained and the owner needs his car badly, how would you go about making a new clutch leather for this car?—O. W., Ohio.

The cutout or circuit breaker is put on the circuit from the battery to generator for the purpose of preventing current from flowing from the battery to the generator when the latter is inoperative. It acts as a sort of check valve in the generator-to-battery line.

Again, if the generator is driven so slowly that the voltage of the current is not greater than that of the battery, the flow of current would be away from the battery and would exhaust it. The circuit breaker automatically prevents such occurrence.

The cutout is adjusted so that it closes the circuit and allows current to flow into the battery at a car speed of  $7\frac{1}{2}$  miles per hour and does not cut out or break the cir-

If the circuit breaker is removed for any reason, the car must not be operated until a short piece of bare copper wire is securely connected between the wire terminal posts of generator, and the ends



Stripped Gear on Flywheel of Hudson.

of the wires leading to the circuit breaker must be taped to prevent them from touching each other or any metal part of the car.

2. If it is impossible to obtain within a reasonable time the made-up clutch leather from the factory or the nearest service station for this particular car, and the owner is very much in a hurry, one may be made from a piece of unstretchable belting.

The leather should be cut as shown in the accompanying sketch and the ends beveled off smooth and cemented before installing on the clutch cone.

#### Repairing Gear on Flywheel.

One of my customers stripped six teeth off the starting gear on the flywheel of a Hudson 6-54. This prevented him from using the starter, so he brought the car to me and asked me to fix it. I told him I could not and thought he would have to buy a new flywheel. Of course, if I had the necessary machinery I could have welded it and cut the new teeth.

How would you have handled this job? I am particularly anxious to know how, after the material had been welded on, the teeth could be cut by hand. I will appreciate any information which you can give me on the subject.—B. H., Ill.

You were probably right when you told your customer you could not fix the stripped teeth, especially since you did not have the machinery with which to re-cut the teeth. It would have been an almost endless and very costly job to cut or dress the teeth by hand after welding them, even after getting a soft weld. Had the teeth been open at both ends, it would have been much simpler.

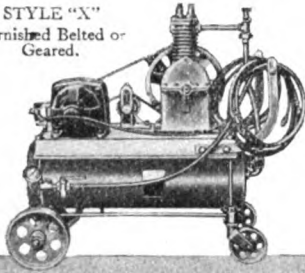
However, the job may not have been as bad as one would think from your description. The words "stripped six teeth off the starting wheel" suggest the worst kind of a job, while in reality the usual thing in such an occurrence is that only part of

cuit until the speed drops to about 6 miles per hour.

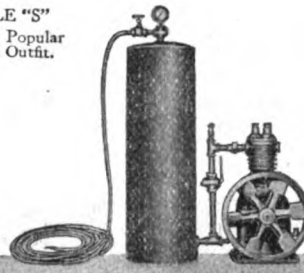
The circuit breaker operates automatically and requires no lubrication or attention.



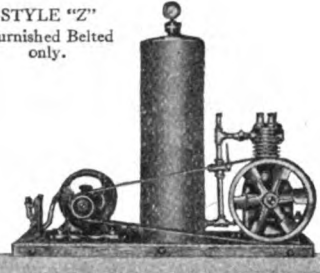
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the teeth are stripped, and the stripped part is the open end of the teeth.

If this is the case, new teeth should be "built on," one at a time, with soft iron filler. This is frequently done if not much over half of each tooth is sheared off. The process requires considerable skill and a steady hand. The torch operator is liable to become exhausted and nervous if he is required to build very many teeth at one time. However, he should be able to do six without much trouble.

If only the corners or ends of the teeth are stripped, they may be dressed or shaped with files, but if the whole tooth is gone, it is a hard job to cut out the inner corners with chisels; if the latter is the case, it is better to weld the teeth in one block.

To build the teeth up one at a time, the filler metal should be applied a layer at a time, gradually drawing them in at the top of the teeth. The sides and ends are given a rough finish with the welding flame by employing it to blow or brush the metal smooth. A liberal supply of flux should be applied during the welding.

To save time and gases, the whole wheel should be preheated to a dull red before and during the welding. The work should be done as rapidly as possible, each layer being securely fused with the preceding layer. A small tip and small filler rod is best for this class of work.

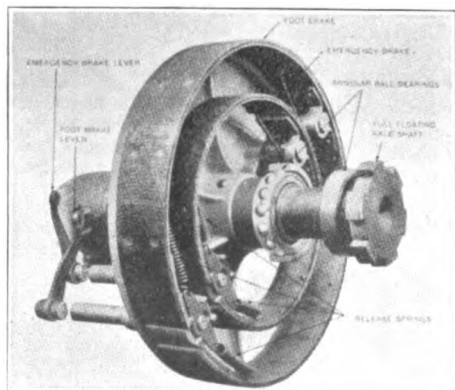
\* \* \*

### Squeaky Brakes.

What causes squeaky brakes? How can the noise be prevented? I have adjusted the brakes on a Jeffery Four twice, but they will insist on squeaking.—S. C., Minn.

Squeaky brakes result from poor adjustment or poor brake lining. Some are very stubborn, but in nearly every case they can be prevented from squeaking, unless the brake lining is a cheap brand, in which case it can be abated by using anti-squeak waffles, or enduring the noise until they wear out.

You may have the brakes properly ad-



The Jeffery Braking Mechanism.

justed, but the rods or equalizer levers may be rusted and prevent one set working properly, thus throwing most of the load on the other wheel, which results in abnormal friction and squeaking.

Start with the brake pedal, disconnect each part and oil thoroughly with half and half of heavy lubricating oil and kerosene. Try each part to see that it is working properly and works to the extreme limits

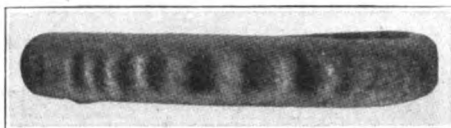


Fig. 1.—Thread Loosened From Fabric.

of operation. Do this to all the levers and rods to the brake mechanism. Undoubtedly, you will find one of them rusted and not working properly.

After all these have been examined, connect up and adjust the brakes. The brake-rods have turnbuckles on each end and wear can be taken up by shortening them, or by changing the position of the adjustable levers on the horizontal cam shafts, as shown in the illustration. Adjust equally so that the pressure is the same on both wheels, and tight enough to hold under all circumstances, but not so tight that they will drag.

It is not good practice to only take up the wear entirely on the turnbacks, as this will make the brakes drag on account of decreased range of release. Take up the wear as much as possible at the brakes and use the turnbuckle for a finer adjustment.

Sprinkle the brakes with a little Fuller's earth, and lubricate all bearing surfaces on the brake mechanism.

\* \* \*

### Stanley Steamer Car.

Will you kindly answer the following questions in the next issue of the American Garage & Auto Dealer, concerning the Stanley steamer car, which information I am unable to get in this locality:

1. Location of the engine?
2. Location of the boiler?
3. The usual steam pressure carried?
4. Time required to raise steam pressure when cold, and time required if standing for a while after having been used?
5. Fuel consumption?
6. Water capacity and consumption?
7. Location of control parts?
8. Advantages or disadvantages of a steam car?

1. The engine is located in front of the rear axle.

2. The boiler is located in front of the dash, underneath the hood and behind the condenser. The condenser is also the radiator.

3. The normal pressure is 600 pounds. For speed purposes, however, the pressure will run up as high as 1,200 to 1,500 pounds.

4. The time required in steaming up a car when cold is about fifteen minutes, which includes filling of the tanks and boiler as well as the raising of steam pressure. No time whatever is required for raising running pressure.

5. It has been claimed that one of the

Stanley five-passenger touring cars was run for three consecutive months, making an average of twelve miles per gallon of coal oil. On long runs this figure is increased to 16 or 17 miles.

6. The water capacity is twenty gallons carried in a tank beneath the car frame and filled through a radiator. This capacity is sufficient for a day's run.

7. The throttle subimposes on the steering wheel; foot brake, usual position; reverse, a foot brake; the emergency, a handle brake located on the side of the car.

8. It is claimed that the advantages of a steam car are: Lack of vibration, freedom from gear shifting, absence of clutch, flexibility, more power for weight than is possible in gasoline cars, cannot freeze up in cold weather, simplicity of controls, greater tire mileage, small depreciation, and no smoke or steam visible in cold weather.

The disadvantages in early models were: Shape of hood, necessity for firing up, likelihood of freezing, necessity for taking on water every fifty miles, before condensing system was used.

\* \* \*

### Under-Inflation of Tires.

Have you a picture of a tire that was insufficiently inflated? If so, please publish. I expect to take on tires in the near future and am not sure that I know just how an under-inflated tire looks.—T. M., Wis.

We are publishing two views of under-inflated tires. The lower the tire pressure, the more it flattens out under load. The wavy condition of the tread as shown in Fig. 1 is due to its loosening from the

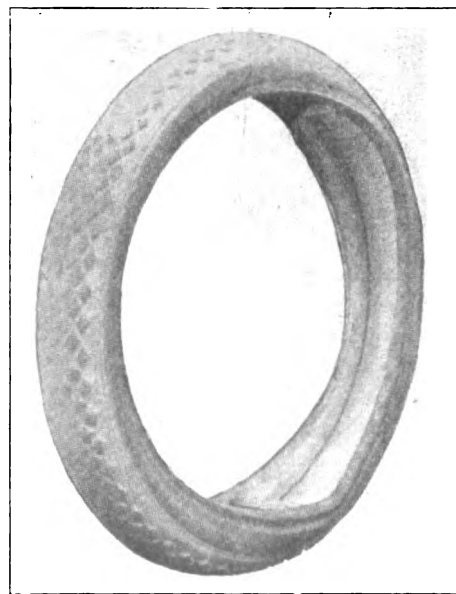


Fig. 2.—Fabric Broken in Side Wall.

fabric as a result of insufficient air.

The flattening of the tire causes the side walls to bend more sharply and the final result is the breaking of the fabric in the side walls, as shown in Fig. 2.



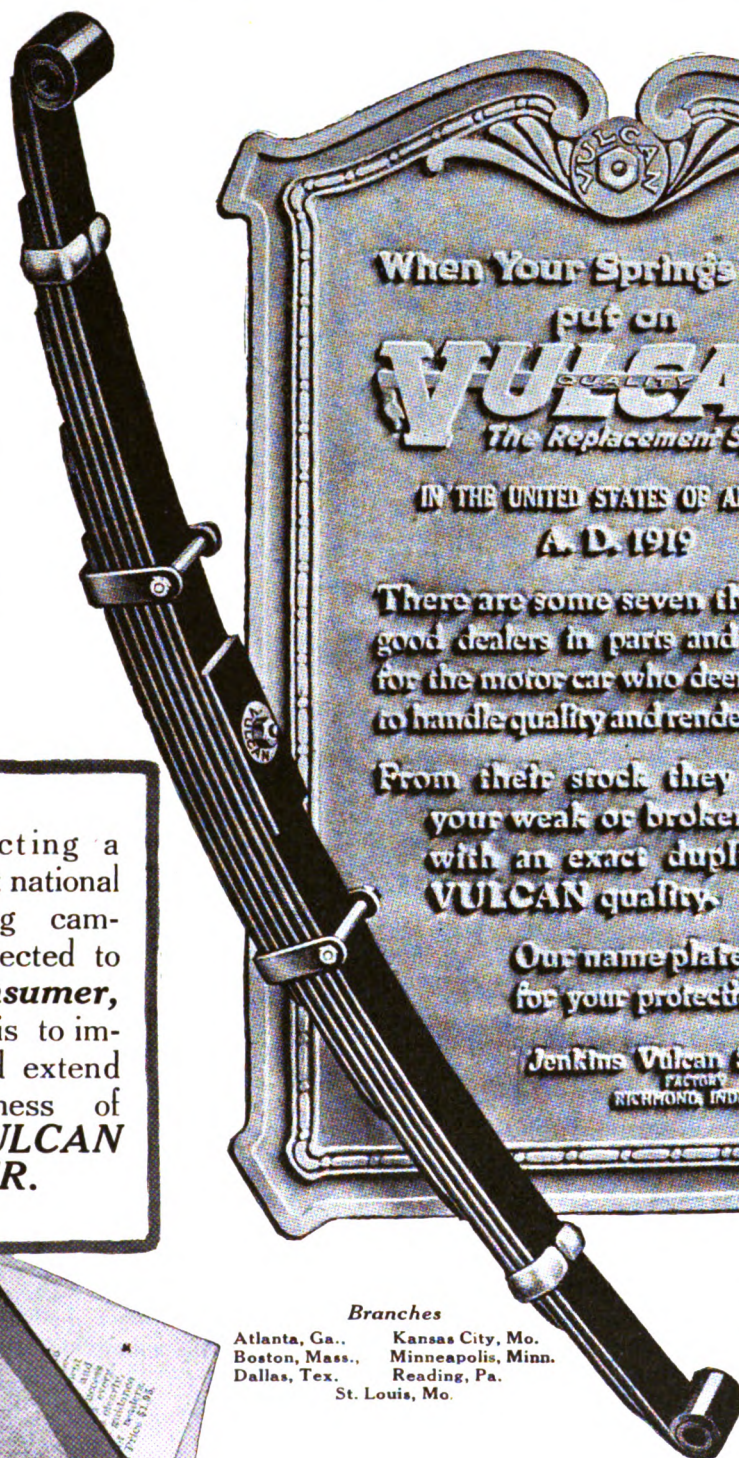
24

LESLIE'S WEEKLY

October 25, 1919

This advertisement appeared in Leslie's on Oct. 25th, 1919, and in Collier's on Oct. 4th, 1919.

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There are some seven thousand good dealers in parts and supplies for the motor car who deem it wise to handle quality and render service.

From their stock they replace your weak or broken spring with an exact duplicate of **VULCAN** quality.

Our nameplate is  
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*Factory Richmond, Ind.*



# Installing a Ford Electric System

Method of Installing Starting and Lighting System on Ford Car—Explanation of Details Which Cause Trouble and Delay Work—Locating and Remedying Electrical Troubles—Some Practical Hints on Operation and Repair

By J. N. Bagley

For a number of years various starting and lighting systems have been installed on the model T, Ford car. While many of these starting systems worked very well, none of them were universally adopted by the Ford car users. To install one of these starters it was necessary to use brackets, chains, etc., and, no doubt, the necessary strain and vibration had much to do with getting satisfactory service out of the starting and lighting systems.

But today it is different. Father Time has brought about a great change, and nowadays most cars are electrically equipped; in fact, it is next to impossible to sell a car without this equipment. Now that the Ford car can be had fully equipped, when desired, the repairman will need a few hints on care and repair of the equipment and it is the purpose of this article to offer a few helpful hints and suggestions.

The basic principles of all electrical starting and lighting systems are very much the same, but the little details usually take time to work out.

The Ford starting and lighting system is of the two-unit type; that is, it consists of a generator mounted on the front end of the engine—or rather built-in—and a starting motor on the rear. The storage battery is under the floor in front of the rear seat; the charging inductor is on the dash; and the lights—bright, dim, and tail—are controlled by a switch on the dash. On top of the generator is mounted a small, box-looking affair into which is placed the automatic cut-out or, as some prefer to call it, the relay.

The purpose of this automatic cut-out is to control the output of the current from the generator to the storage battery. It serves a two-fold purpose; that is, it cuts the current out when the speed of the generator is so low that it cannot over-balance the charge already in the battery.

When the speed of the generator is advanced and the current pressure increased sufficiently to overcome that already in the

battery, the automatic cut-out cuts the current into the battery and the instrument on the dash—the ammeter—registers the generated current in amperes. When the generator is at rest, the automatic cut-out cuts the line to prevent the stored current in the battery from draining back through the generator. Therefore, the ammeter on the dash should be watched at all times, for it indicates charge or discharge of the battery.

In case it stands at discharge with all switches open and lights off, either the automatic cut-out is not cutting the line,

to 15 miles per hour, should be about 10 amperes. The reading with the lights burning brightly and the car standing, should be about seven amperes, while with the car running 15 or 20 miles per hour and the lights burning brightly, the ammeter will show a charge of two to five amperes.

There are times when the ammeter is defective and this can be found by turning the switch and lighting the lights. If the lights burn brightly, and the ammeter indicator stands at 0, either the wiring is disconnected or the ammeter is defective.

To test the ammeter, remove the two wires from the binding post on the back side and take a No. 6 dry cell with a wire leading from each post and attach each of the wires to the binding posts on the ammeter. If the ammeter needle fails to move, the instrument is defective. If it shows discharge, the trouble is in the wiring and can easily be located.

In replacing the ammeter with a new one, care should be taken not to get the

wires crossed leading to it, or the indicator will read backward; that is, when the lights are burning, the ammeter will show charge. This, however, will do no damage. To correct, simply reverse the wires.

The lighting switch gives very little trouble. The only trouble of any consequence is the coil terminal short-circuiting with "Bat." terminal. This trouble will be noticed at once, for when the ignition is turned off, the engine continues to run. The switch key should not be turned to the magneto side while it is shorted, or the battery will discharge directly into the magneto coils at the rate of 18 to 22 amperes while the engine is at rest.

In case the headlight terminal is short-circuited with the coil terminal and the switch key is turned to the magneto side, the headlight bulbs will be burned out; but if the battery side is used for ignition, the headlights burn brightly, even though the

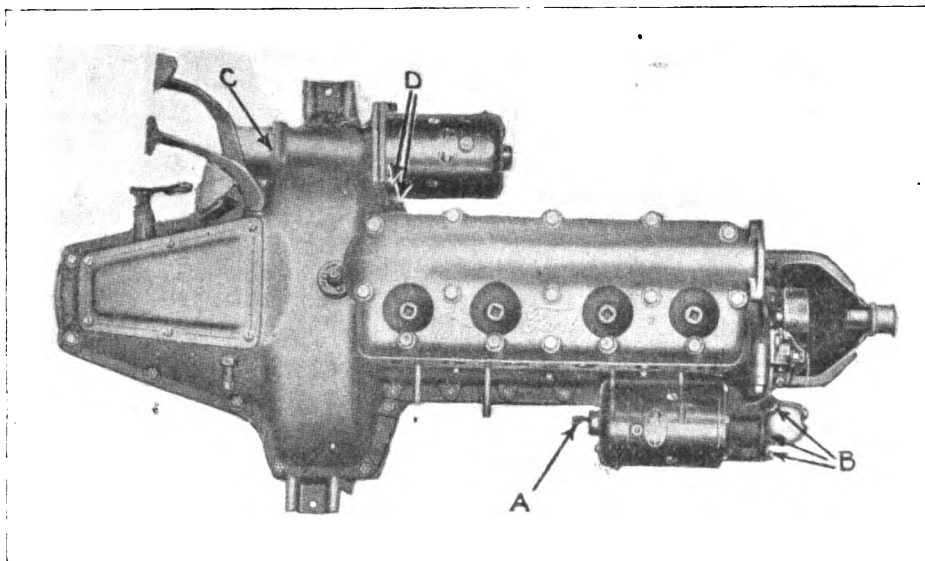


Fig. 1—The Ford Engine Showing the Installation of Electric System.

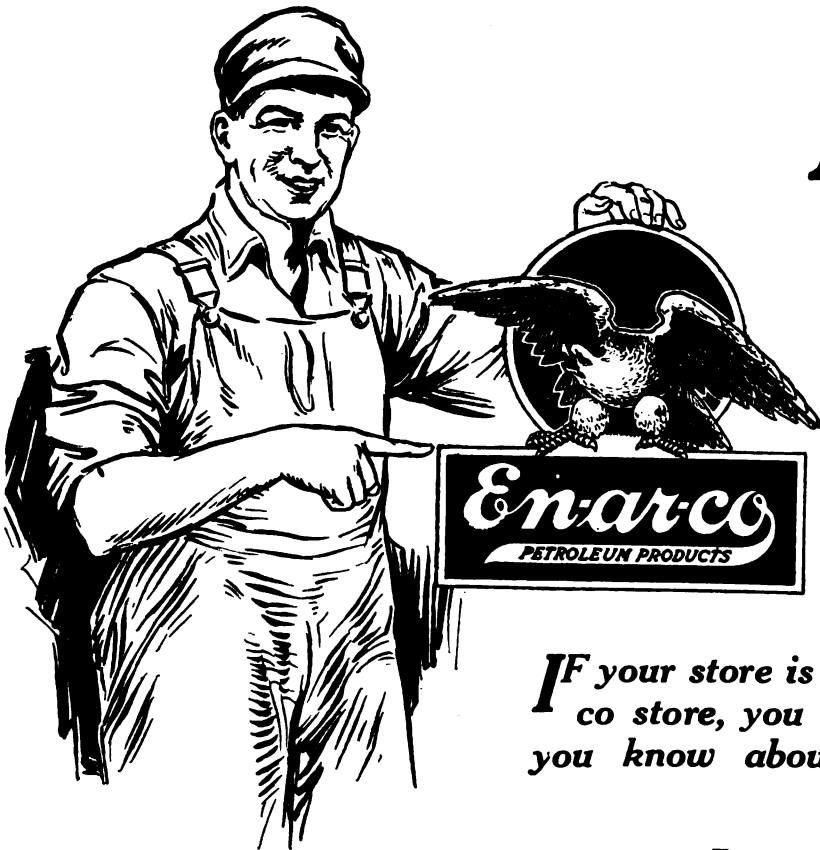
or there is a short-circuit somewhere in the line. Immediate attention should be given or the battery will discharge very rapidly.

In case the trouble cannot be located, remove one of the large wires from the battery until it is. This will prevent the battery from being discharged and many times ruined, for the rapid discharge, due to a dead short, is very injurious to the battery.

The lubrication of each of the units is taken care of by the splash system, except at the outer end of the generator, as shown at A, in Fig. 1, where a few drops of light oil should be supplied occasionally. Care should be exercised in oiling at this point, for an over amount will find its way to the armature and brushes, and prevent the generator from delivering current to the battery.

The ammeter needs no attention ordinarily, as it shows the charge and discharge to and from the battery. The ammeter reading, when the car is running 12





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***If your store is not known as the En-ar-co store, you will want it to be, when you know about our BIG sales plan.***

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In order to obtain the game, information as to their oil requirements must be given. They are directed to call at your store to procure the game. This brings you into direct contact with them and gives you the opportunity to talk to them about their oil needs, and introduces you as the En-ar-co dealer.

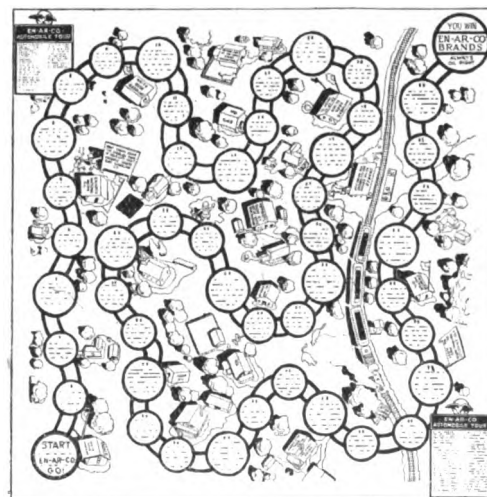
The details of this plan and how it is working, how the game is taking with old and young, the merits of En-ar-co oils, will be given you if you are at all interested in selling this intensively advertised, branded line of oils and lubricants.

The winter season is the time to cash in on the contact the auto game will give you. You will get some idea of the supply of oil you will need to take care of their orders, and you will be all ready when the demand is on.

En-ar-co oils are the product of years of expert refining, not only to produce an article of given quality, but to insure that same quality from year to year. That is what has made the En-ar-co sign mean so much to tractor, truck and automobile users.

*Full details of this plan to you by first mail if you're ready*

**National Refining Company**  
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**This is the New Auto Game  
That will Bring Oil Buyers to Your Store**

lighting switch is turned off. Should the magneto terminal short with the dimming side of the switch, the dimming bulbs will be burned out immediately.

The troubles mentioned do not occur often with the new type of switch. However with the old style switch, the trouble was very common. To remove the switch from the instrument board, take out the four screws at the corners of the panels and pull the entire assembly forward until all wires can be inspected.

The starting switch gives very little trouble. However, there are times when the current arcs from one insulated terminal to the other, causing the surfaces to become pitted. These surfaces can be smoothed up with sandpaper, not emery cloth. All connections to the starting pedal should be made tight so that a drop in voltage will not take place and cause the starting motor to run so slow that it will not start the engine.

#### Removing the Generator.

Many times it is necessary to remove the generator from the car, to make certain repairs that cannot be made with it attached. To remove the generator requires but a few minutes' work with the proper tools. First, remove the wires from the generator and lay them carefully to one side and then remove the three cap screws, *B*, Fig. 1, that come from the front side of the end cover of the engine. When the screws have been removed, the generator can be taken from the engine very quickly.

In case it sticks and cannot be taken down with the hands, place a screw-driver blade between the generator and the front-end plate from the top side. Open it up about 3/32 of an inch and with the left hand take hold of the back end of the generator and raise it up and down, at the same time forcing the screw-driver blade deeper into the opening. When the generator comes out, it is entirely disconnected and can be taken from the car at once.

In case it is necessary to use the car with the generator off, as is many times

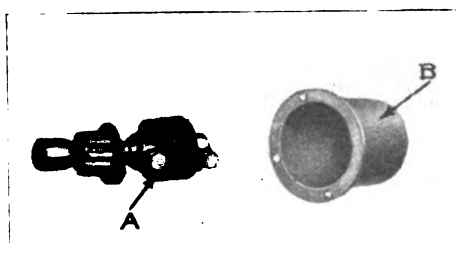


Fig. 2—The Bendix Drive Assembly.

the case, a plate should be used to cover the opening and prevent the oil from being thrown out when the engine is running. A very good substitute for the regular Ford plate can be made from a thin block of soft wood, held in place with small bolts with nuts on the outside of the front-end cover. The car can be used

now just as it would in case the generator had never been installed.

When the generator is ready to be replaced, the block can be removed and the generator replaced just as it was taken off, care being taken to see that the cap screws, *B*, are sufficiently tight to hold the generator up to the casting so that the oil

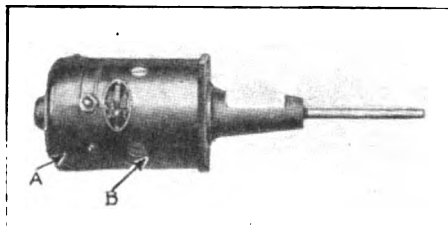


Fig. 3—The Starting Motor.

will not work out as the car is driven. It is not a bad plan to use a little gasket shellac on the face of the end casting when replacing the generator, as oil cannot find its way through a joint that has been shellaced.

Make doubly sure that the gear pinion on the end of the generator shaft is made secure before placing the generator in position, for it would be a source of annoyance in case it should come loose while driving on the road and would, no doubt, result in costly repairs.

#### Removing the Starting Motor.

From time to time it will be necessary to remove the starting motor from the car for repairs or to get the transmission cover off to replace the transmission bands. In either case, the operation will be identical.

In the first place, remove the four small screws holding the cover over the shaft back of the flywheel, shown at *C*, Fig. 1, placing the cover to one side with the screws inside it. The Bendix drive shaft is now exposed, turn it over slowly until the set screw on the end of this shaft is pointing to the left as you face the rear of the flywheel.

When this set screw is removed, a small split spring washer will be found with spurs on either side, one bearing against the Bendix collar and the other against the screw head. This washer usually breaks as it is taken from the setting and even though it does not, it is a very good plan to replace it with a new one when assembling, or the washer will break when it is replaced.

Referring to Fig. 2, we have the Bendix drive assembly as it is taken from the shaft, after the set screw and key have been removed. This leaves the motor ready to be taken from its fastening as soon as the four screws at *D*, Fig. 1, are removed. We now have the starting motor, as shown in Fig. 3, ready to be taken down for repair.

In taking the motor from the car, much time will be saved by taking it down through the chassis where the dust pan has been removed, rather than to try tak-

ing it out over the top of the engine, for the steering gear and dash will interfere with its free working.

Should it be necessary to take the motor apart for repairs, the first thing to do is to remove the cotter pin, and take out the screws. With a pair of suitable pliers—preferably long nose—take hold of the wire close up to the brush and pull it back until the brush spring snaps off the back of the brush, and leave it in this position. The spring will hold the brushes back until the commutator can be taken out without danger of chipping the brushes.

In replacing the brushes, remove the screw holding the wire and pull them out past the spring. Note the condition of the commutator to see that it is not covered with dirt and grease and also that it is not cut with small grooves which will prevent it from working well when the starting switch is closed.

#### Commutator Rough and Short-Circuited.

At times it will be necessary to take the armature out of both the starting motor, Fig. 3, and the generator, Fig. 4, and dress up the commutator with sandpaper or, better still, in a lathe in case one is at hand. After turning the commutator down until it is smooth, it will be necessary to carefully go over each segment with a suitable tool and see that no small thread of copper is bridging across from one segment to the other.

Should the starting motor fail to turn the engine when the starting pedal is closed, the first thing to do is to examine the battery and take a hydrometer reading. In case the battery shows full charge and the starting motor is not affected when the starting pedal is closed, examine the connections to the battery and note whether or not they are tight. Many times a loose connection at some point is causing the trouble and can be located by starting at the battery and following back, taking each one at a time until the entire line is gone over.

Many times the starting switch is at fault. This can be tested out by short-

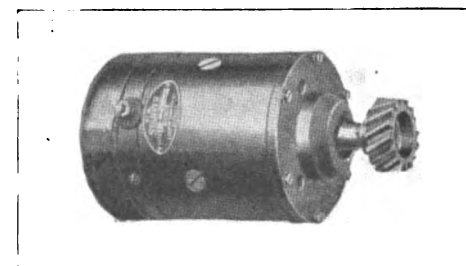


Fig. 4—The Generator.

circuiting from one terminal to the other with a pair of pliers or a tool made for this special purpose. Should the starting motor start when the two terminals are short-circuited, it indicates plainly that the trouble is in the starting switch. This should be removed and gone over carefully.



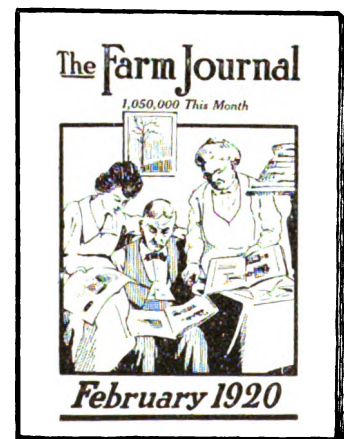


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*Six copies of the store sign illustrated above will be sent free and prepaid to any garage man or accessory dealer who asks for them*



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The Paper that moves the most parts and accessories  
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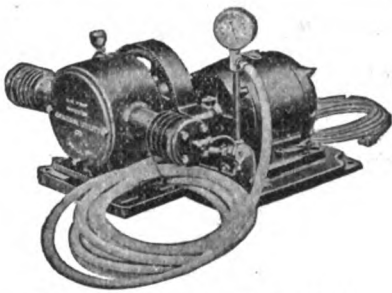
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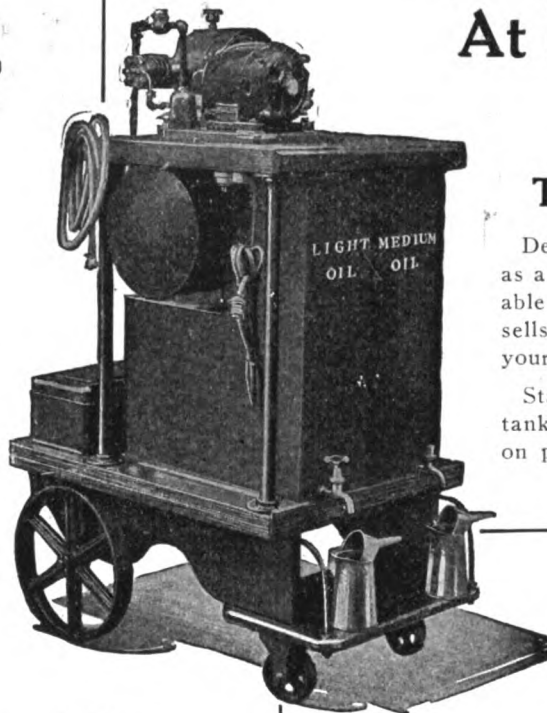
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Their construction insures the greatest reliability and low maintenance cost. They are built in our own factory which is equipped with the most modern machinery and has proved itself capable of turning out compressors of a uniformly high quality that gives place to the product of no plant in America.

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*We want to get in touch with distributors to cover some desirable territory still open.*



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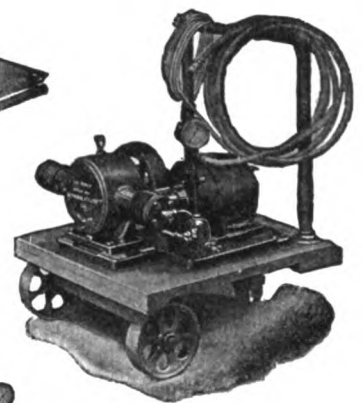
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Standard Compressor with air tank, two oil tanks, and tool box, on portable stand.

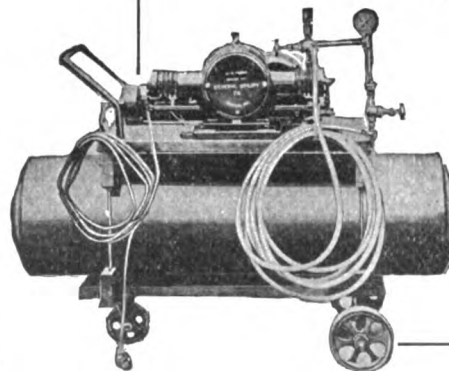
### Direct Portable Model

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—For giving tank service right at the car. Standard compressor rigidly mounted on top of tank. Automatic start and stop switch. Also furnished as stationary outfit.



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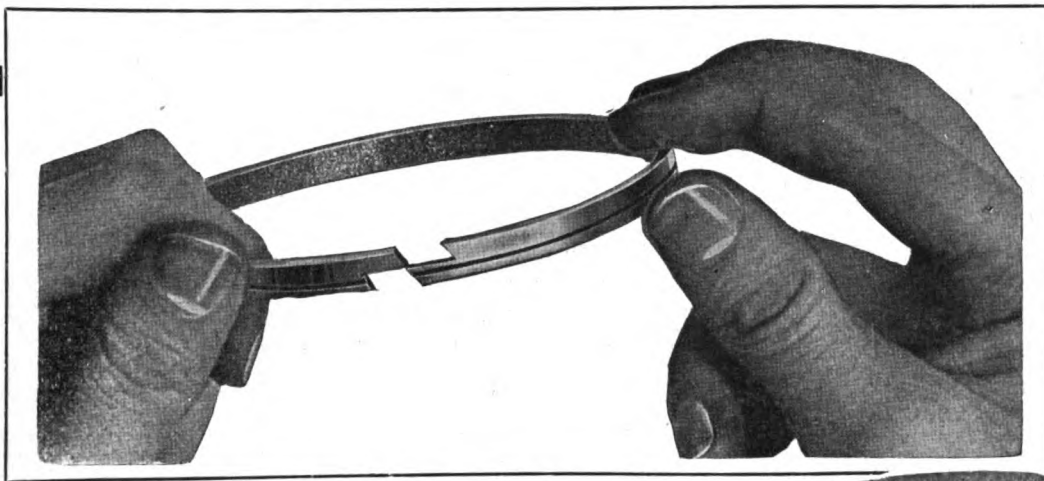
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Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.





## Trench vs. Open Warfare Against Friction

**T**HE trench-like, oil carrying groove of the General Lightning Cut Piston Ring changes the open warfare against friction as now waged in automobile cylinders into a new and scientific trench warfare.

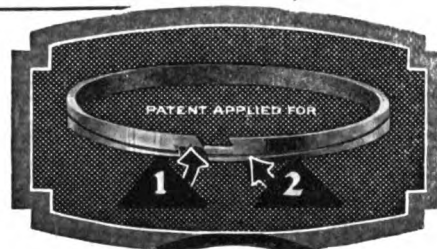
This remarkable improvement in piston ring design, reaching and lubricating heretofore untouched high points on the cylinder wall, as well as the ring itself, protects and greatly prolongs the life and efficiency of the ring.

Oil, controlled by the scraping edge of this groove and returned to the crank case, represents more than an economy; it eliminates the formation of just so much carbon.

## GENERAL LIGHTNING CUT PISTON RINGS

are individually cast; concentric in shape and of one piece construction. There are reasons why for all three manufacturing decisions. The results obtained are invariably more power, more mileage, less fuel, less oil, less friction and less wear.

*Write for further details and sales proposition.*



1. The Lightning Cut.
2. Oil Distributing Groove.
3. RIGHT: Shows shape of oil groove. Note Scraping edge.

BOTTOM: Shows upward course of oil groove.



# CORPORATION

Representatives

ITY COMPANY

New Stock Exchange Bldg., Philadelphia

Two Cylinder  
**GENERAL**  
AIR COMPRESSORS

*Because They Serve*

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

**Accounting.***(Concluded from page 29.)*

side labor, law and audit, subscriptions to trade journals, advertising, insurance, heat, light, power, etc. These will be posted to the purchase journal classified under the proper heading as Shop, Sales, and General.

**WAR TAX DEBIT:** Some of your merchandise will undoubtedly be purchased "war tax" included. War tax must be shown separately and should be shown separately on your sales tickets.

**MISCELLANEOUS DEBIT:** To this column will be posted all invoices for furniture and fixtures, shop equipment, repairs to buildings, etc.

**MERCHANDISE DEBIT:** Here will be posted the majority of your invoices—gas and oil, cars, parts, supplies and accessories, tires and tubes, etc. You will notice that invoice cost and transportation cost are separated. This is done mainly that carriage charges—freight, express, parcel post and drayage—may not be overlooked when setting up cost of merchandise. Of course, if a rubber stamp is used and the carriage charges are shown on the invoice, the total may be posted to the invoice column.

Many business men like to know, however, what percentage the transportation is of the total cost. One thing must always be remembered: transportation charges are not expenses, but part of cost of the merchandise. The purchase detail is self-explanatory and the total of all the columns on this side must equal the total of the amounts posted in the merchandise column.

Some sample entries to the purchase journal are shown below. These do not agree entirely with accounts posted to the cash journal, as it was not thought that the recapitulation, or totals, as shown, covered sufficient purchase journal details:

The Chevrolet Motor Co. invoices as follows:

Chevrolet touring car.....\$1,050.00  
M. C. R. bills of freight on

car ..... 70.00

The Auto Parts Sales Co. invoice:

Supplies and accessories...\$ 42.00

Tires and tubes..... 105.00

American Express Co.: .....

Express on above..... 6.50

The Sinclair Oil Co.— .....

Gasolene .....\$ 20.00

Oil ..... 60.00

Grease ..... 6.50

Paid Nov. rent, Jno. Smith. 50.00

The Alling Co. presented bill

for insurance ..... 15.00

American Surety Co., salesmen's bonds ..... 30.00

The Daily Tribune, advertising ..... 40.00

Petty show expenses..... 7.60

Burroughs Adding Machine

Co. (Note) ..... 350.00

Reliance Machinery Co.... 400.00

These entries are shown posted in detail to the purchase journal. As previously stated, they might all be posted in detail direct to the cash journal, but the records are clearer when the purchases are kept together and also the sales.

The best way to understand the purchase journal is to post your own invoices to it. Any subscriber who cares to send in copies of a week's invoices will receive them back by the earliest possible mail, posted as they should be posted and with full explanation of all the posting.

In the next article some shop forms will be presented and shop records discussed from a practical standpoint.

[AUTHOR'S NOTE: I wish to turn back to the cash journal in the December issue and correct the entry for sales ticket No. 671. On the credit side \$423.50 should appear a credit to accounts receivable instead of notes receivable. This will increase the accounts receivable credit footing to \$736.10 and decrease the notes receivable footing to \$200.00.]

**Impending Competition in Motor Sales in Denmark.**

The latest report of Vice Consul Joseph G. Groeninger, of Copenhagen, Denmark, shows that the number of motor vehicles in use in that country is: Automobiles, 5,418; trucks, 939; motorcycles, 6,720. These are classified as follows:

**In Denmark:**

Pleasure cars under 12 hp. .... 2,200

Pleasure cars over 12 hp. .... 600

Cabs ..... 950

Trucks ..... 275

Motorcycles ..... 5,000

**In Copenhagen:**

Pleasure cars under 12 hp. .... 817

Pleasure cars over 12 hp. .... 472

Cabs ..... 379

Trucks ..... 664

Motorcycles ..... 1,729

At present there is a big demand for trucks, although prices are very high.

**Sum Fokes is born Nutts.***(Concluded from page 17.)*

the first time I fixt a window since I came here. Ive bin maiking my own sines evver sinse. And sines like that one you dug up have bin lying there in the stock rume I suppoze just going to waist, and me plugging away at these home made freeks. Aint it hel?

"And Ile tel you sumthing, Bill," he says. "When ennybody seeze those tires advertised like I was maiking a sine for, they see a certain picture in the advertisement, dont they? Its a picture with that moovey daim in, aint it? Wel, when they walk along the strete and see that sine and that daim's picture in our window, they see rite off that we sel thoez tires. They dont even haf to reed the sine. The picture does the bizness. But when I maik my sine, I have to maik it in words. They can reed it all rite, but probably they dont, and ennyway that picture sine of theyers ties up this garaje and the big advertising they see in the magga-zeens. Ive bin asleep at the swich, not using thoez sines. Do you get me?"

"I gess I got you," I says. "Youre all rite only you aint bin using your bene. Is that it?"

"That's it," Spike sed and he was willing to admit it.

"Howd you like to have me look thru that pile of junk out there and maik a list of all the good sines and things there?" I askt him. I was kind of interested in that gaim, especially if that pile was full of moovey daim's pictures. I wanted to get a picture of Mary Pickferd and one of Mable Normun to put on my wall where Ive got rume for 2 more.

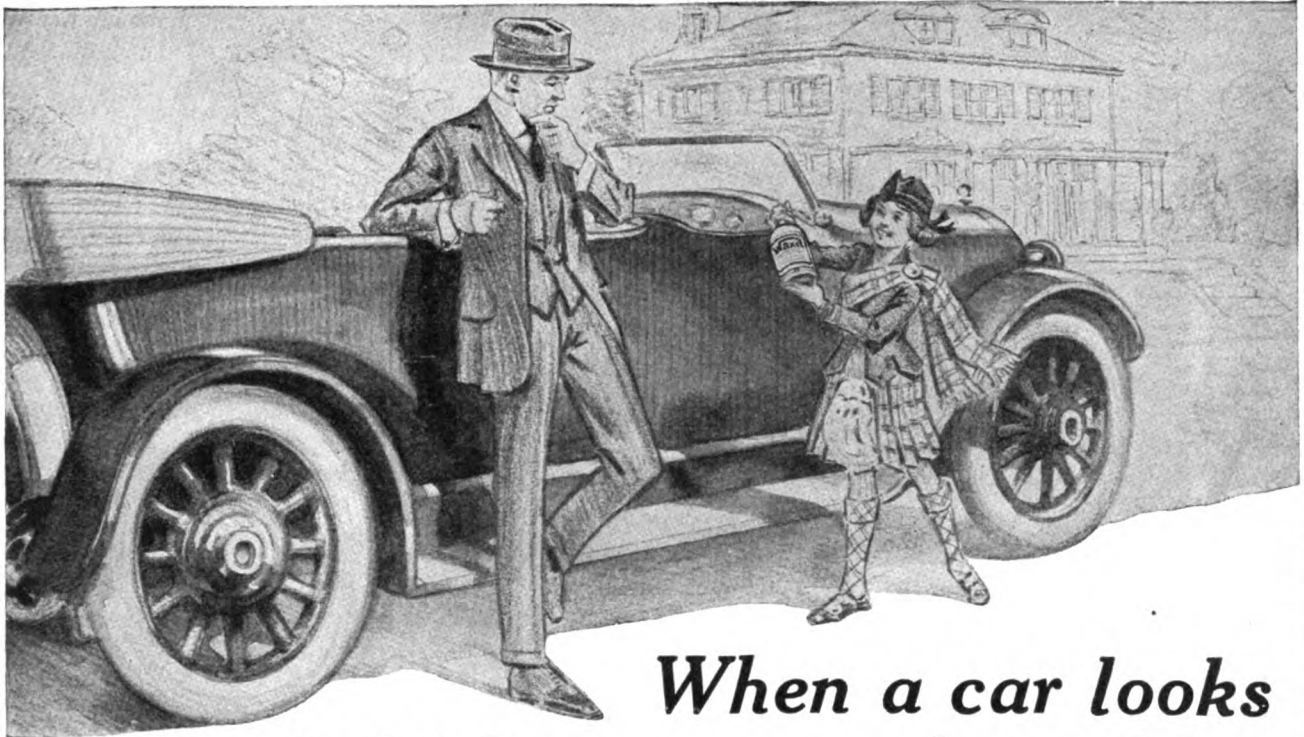
Spike told me to go to it and if the boss called me, hede tel him what he had me doing. And say, bimeby the boss himself cum out and sed, "Spike told me what you discuvvered. Ime glad you brought it to his attenshun. He got a rong ideeah from what I sed about sines. I want all this advertising stuff from the manufacturers used. Its good stuff. Ide bin wondering about it."

I diddent tel him Ide bin looking mostly for Mary Pickferd and Mable Normun. I dont have to tel everything I kno. Ime that way.

Yours till we blow out.

BILL.

P. S.—There wassent another moovey girl in the hole pile.



*When a car looks  
dull and old from too much washing*

Renew Its Youth With

**Waxit** "The  
Perfect  
Polish"

WAXIT has saved the day on many a used car sale. The finish "came back" under the youthifying touch of WAXIT. A Chicago owner sold his car for \$200 more after a few applications of WAXIT.



Dealers use it for the final rub both on used cars and new cars. It keeps a new car from *growing old*.

WAXIT has no equal for automobiles. Quick in action. Cleans and polishes in one operation. Little rubbing needed. Leaves the surface dry, repelling instead of collecting dust. Keeps the varnish smooth and elastic and prolongs its life. It is making good with the dealer in a big way, because it makes good with the car owner.

**FULL SIZE PACKAGE GLADLY MAILED ON  
REQUEST. Write on your letter-head today.  
Carried by all leading jobbers.**

**Waxit Manufacturing Co.**

1539 Plymouth Bldg.

MINNEAPOLIS, MINN.

WAXIT MFG. CO., 1539 Plymouth Bldg., Minneapolis, Minn.  
Kindly send me full size package of Waxit and dealers' proposition. My jobber's name is:  
Name .....  
Address .....  
City ..... State .....

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

### Watch Your Collection Letters.

(Concluded from Page 16)

to protect the reputation and property of the citizen. The courts, the lawyer explained, sometimes made rulings which puzzled the average correspondent as to the limits of his correspondence.

The lawyer quoted the case of a merchant who wrote a certain debtor upon a postcard saying: "I can very plainly see that you do not intend to pay any attention to my letters and your agreement. I shall wait no longer, but shall see what can be done."

The court held, in the subsequent trial, that the writer intended to reflect upon the character of the debtor. The statements were admitted to be true but held to be defamatory. Result—a very satisfactory verdict for the debtor, many times the amount of the bill in question.

"I could quote you hundreds of similar cases," concluded the lawyer, "but the verdict is always for the debtor. Never use a postcard when writing to a debtor, if you can help it. If you use a postcard, do nothing further than merely state the amount and discount limit. In other words, do not publish the delinquency of the debtor to the general public and you will be on the safe side."

The advice was good and Charlie Cron has never since been guilty of even a slight violation of any state, national, or postoffice regulation of any kind. He has had his lesson and

has paid for it, and paid for it rather highly too. Other garagemen may face the same situation any day, unless they are keeping a close watch on the phrasing of their collection correspondence.

Don't underestimate the intelligence of the debtor; he may be waiting and watching for you to overstep the limit of the law and when you do, he will be merciless with you and you can expect to give him a receipt for his account in return for the letter.

No matter how delinquent or insolent the debtor is, never permit yourself to write to him while you are angered, for that is the time when you are very liable to overstep the legal limits. The penalties for overstepping the legal limits in your letters are too severe to risk a violation.

The law, whether it originates in a state legislation or the federal congress, is merely the method of enforcing common justice for the rights of others. Observe the law to the letter and you will have no regrets. Censor your collection letters. It always pays.

### Facts About Tire Business.

(Concluded from Page 15)

work. My work stands up, while the other fellow's go to pieces, and I only charge the same as they do, and I did just as much work. I do not understand it." And the public doesn't understand it either. He was always busy, a hard worker, willing, but he

had no executive ability. He would be a good man to work for someone else, but he was just as much a failure as the fellow that did not even try to produce quality work, for the simple reason that he induced the public car owners to believe that he was getting enough for doing their work, and consequently, if another man bought his equipment, it would probably take a long time to convince the customers that the extra dollar or two was absolutely necessary to do the same kind of work that had been done before, and still remain in business.

We will leave it to any tire manufacturer that a tire repair (average section) in a 1/5 circle mold properly cut down and built up is worth at least 1/5 of the price of the tire regardless of tire price fluctuations, which means that tire repair work should increase and decrease in the same proportions.

It is all up to the man if he takes all these things into consideration, and every other vulcanizer that wants to do the right thing. It would not be long until the tire repair business would be only second to the tire sales, a business of gentlemen well thought of and respected in their community.

Not long ago, I saw in one of the New York papers, an advertisement of a certain vulcanizer manufacturing company which stated that 45 cents worth of material and its machine would produce a \$5.00 job. I would not buy their machine, because it can not possibly be what they claim for it: because their advertisement lied, and led people that were car owners to believe that every time we spent 45 cents we made \$5.00.

Just because I am a vulcanizer when I have any work, I get charged extra for it, but lately I just tell them to make it and do not tell them who I am and have saved on \$15.00 worth of work \$4.00, by keeping my identity unknown at the same shop. (This could have been omitted, but it is the truth.)

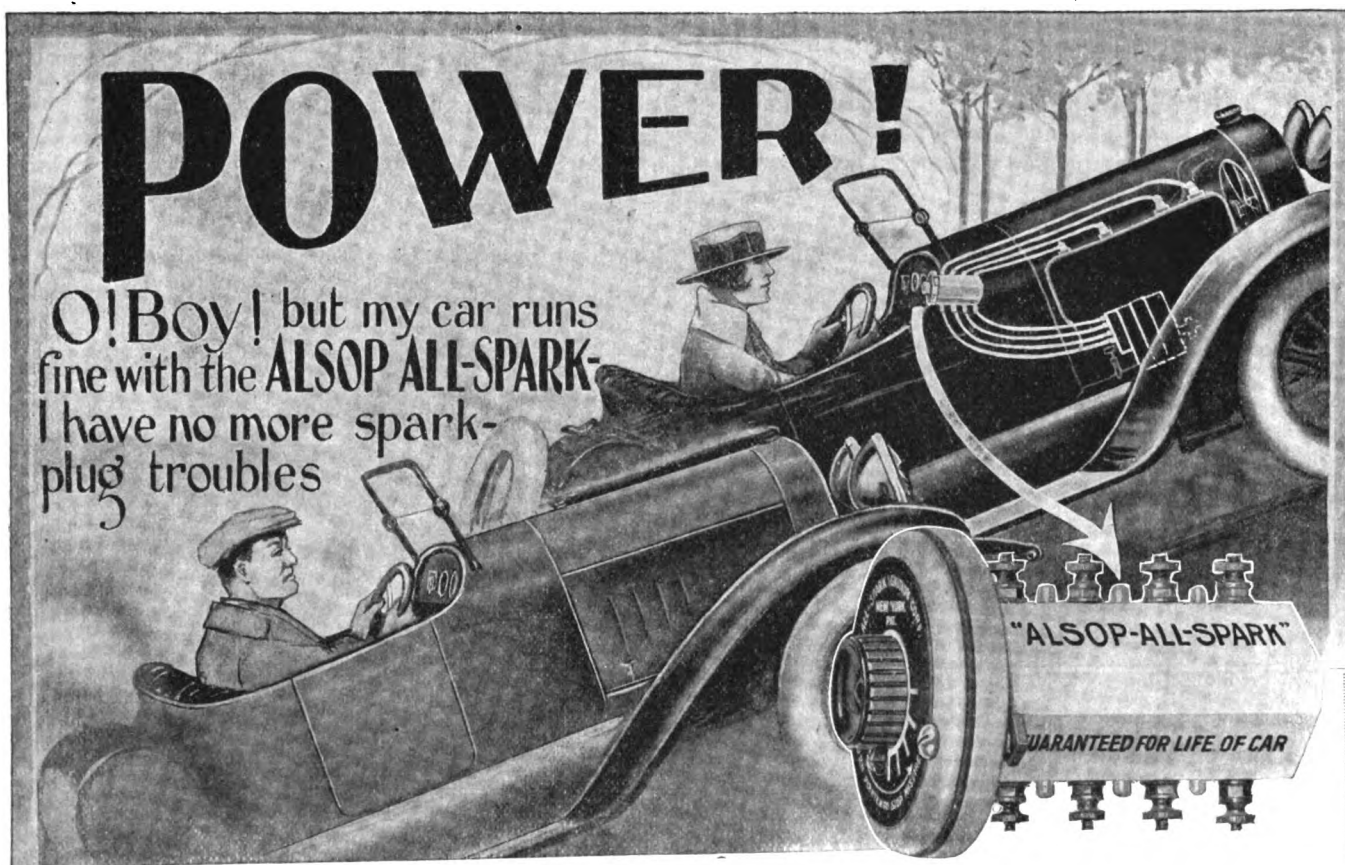
Our retreading success is mainly that no tire is retreaded that is not worth a retread—no tire is retreaded that requires a section—unless under protest at an extra charge, but at the same guarantee. All retreads guaranteed 4,000 miles.

Any dry cure retreader, when proper pressure is obtainable and circle corresponds to tire being retreaded, can retread a tire that will deliver upwards of 8,000 miles and a guaran-



Garage and Salesroom of Modern Garage in California—Front is of Gray-Toned Brick—Salesroom is in Front and Public Garage in Rear—Garage Capacity is 35 Cars—Notice the Well-Kept Lawn and Flower Boxes in the Front Windows.





Address reply to  
 WAR DEPARTMENT.  
 WASHINGTON, D. C.

WASHINGTON  
 DEPARTMENT OF MILITARY AERONAUTICS.

From: Ralph Earle, 2nd Lieut., A.S., S.C. August 22, 1918.

To: Materiel Branch, Supply Section, D. M. A.

Subject: Test of Ignition devices;

1. Reference your memorandum of August 22nd, the six Alsop Ignition Devices per your order have been received and four of same have been installed.

2. The first device was installed August 20th on Ford car No. 28. The preliminary test consisted of using spark plugs with broken porcelains which had previously been discarded as worthless. By the use of the device the necessary spark was obtained through these heretofore useless plugs, enabling the engine to function perfectly with them.

3. The second test consisted of filling the crank case with twenty-four quarts of oil which filled same, the oil running out of the breathing pipes, and running the engine until all plugs were sooted to such an extent that all cylinders but one ceased to fire. The ignition device was then thrown in and within a distance of two city blocks all plugs began to fire and continued to do so throughout the test.

4. The other plugs were installed and are now in operation. No further special tests were made as the above was considered amply sufficient to demonstrate the efficiency of the devices.

*Ralph Earle*  
 Ralph Earle  
 2nd Lieut., A.S., S.C.

## THIS WONDER DEVICE

as one user says, "comes as near making the impossible happen as anything ever seen." The

## "ALSOP-ALL-SPARK" WILL PREVENT SPARK PLUG TROUBLES WE KNOW

- It will save fuel and spark plugs—
- It will fire dead carbon-choked plugs—
- It will cause perfect combustion—
- It will guarantee increase of gasoline mileage—
- It will do away with changing spark plugs—
- It will prevent running engine with a misfire—
- It will give a more powerful spark—
- It will eliminate carbon and vibration—
- It will increase speed and power—
- It will fortify any ignition system.

BUT DON'T TAKE OUR WORD FOR IT—

HERE IS A GOVERNMENT TEST. Read it and then send for our catalogue of Government Tests and Illustrated Information—or better still, send for a device, with money back guarantee. You can install it on any four cylinder car. IT WILL MAKE YOUR CAR RUN AND GIVE YOU A HOT FAT SPARK WHEN EVERYTHING ELSE FAILS. There are no dangerous exposed spark gaps which may set a car afire. **\$7.50**

WE WANT LIVE DEALERS—LIVE DEALERS WANT THE ALL-SPARK.  
**ALL-SPARK IGNITION CO., Inc.** 13-D Water Street  
 New York City

tee of 4,000 miles is perfectly safe, if the repair has been properly built up and cured. Each section should be cured exactly the same length of time, a very slight leak of steam at both ends of mold is preferable and recommended. Tread should be applied as follows:

Cut off as much as possible of the old tread, with knife, then buff with rasp buffer, but do not touch fabric with same, then buff fabric with wire brush until all loose rubber is removed leaving side walls intact. Next give it a coat of cement about consistency of paint, allow to dry; then give it a second coat and allow to dry thoroughly. To tell when it is dry, place uncured piece of tube repair or cushion gum on cemented portion and press slightly. If it comes off easily with cement adhering, the cement is not dry; if the gum sticks tight and is hard to get off it is dry and ready to be built up.

Then proceed as follows:

Take piece of cushion gum, long enough to go around the tire, about two inches wide, according to size of the tire, and start on side of tire at top of side wall and follow side wall line around until coming to starting point, pressing the other two inches on top of fabric, as you go around of course. Then cut strip for other side wide enough to completely cover fabric and partially overlap the rubber first applied; next apply breaker strip after which some claim another coat of cushion gum should be given, but I have never found it necessary; next start a strip of tread gum about 1/8 inch above the cushion gum and cut your strip to go about one inch from opposite side, overlapping your first layer of tread stock.

I go a little higher each time and overlap from side to side until my whole tread is built up, but if camel back is used the wings are cut off and the central or thick portion is placed above the first two layers of tread stock and then it is rolled, pricked and stitched, and ready for the vulcanizer.

If these directions are followed there is no vulcanizer in the country that can improve on it, and if the rubber is compounded properly, there is no reason why it will not wear as long as a new tire, and in many cases longer.

No doubt but that there would be many thousands of dollars saved if the vulcanizers of the country would insist and persist in doing quality

work. Who gains by it in the long run but both the car owners and tire repairmen, and I might add, the tire companies and the car manufacturers and why not?

You hear people remark "I'd buy a car only for the tires. They tell me they cost so much to keep going." But tires today are cheaper than they ever were. Why, how is that? They cost more than they ever did. Of course, they keep the pace of every other article, but where prices and mileage are considered, a tire today costs about one-fourth of what it did in 1908—one-half of what it did in 1912, and only three-fourths of what it did in 1916. And I want to say right here that I have proved on my own cars that a good grade of tire will last 20,000 miles if properly used and treated. Of course, I retreaded the new ones after they had delivered 12,000 miles and three of the five originals are going strong. The average vulcanizer gets a kick out of most car owners and he deserves it. If he gets a smile and chat, he knows he has served well.

Tire companies make adjustments on defective tires and they should and so should a vulcanizer, but he should charge enough for a good job in the first place and then he could afford to do good repairs that would seldom, if ever, need adjusting. Tire companies say fix the holes with some of their compositions while they are small. All I have to say is, it can't be done properly and we all know it.

Would they not be doing themselves a better turn by telling the public to let a vulcanizer vulcanize it and have it over with and properly done? It doesn't cost much and the work is done efficiently, whereas the average car owner would try to mend a tire that was as wet as water could make it, and I might add, that it might be wise to be sure the vulcanizer knows the difference.

But to get down to brass tacks—if you are a car owner and don't believe in vulcanizing, I can't blame you. But try a different man next time and if he does a poor job, try another one. Surely you will eventually and profitably find a man that can do good work and when you do don't crab about the price. You get yours and the vulcanizer has just as much right to his as the tire company has to its.

And if you are a vulcanizer and know you don't know your business or think you can fool the public, cut

it out. Put a sign on your door, "Closed until further notice," and then beat it off to someone somewhere that does know his business, and pay him to teach you and if you are not too thick or too d—n lazy you will have a lot of respectable people saying things about you that they might not have said about some Presidents. And your work won't turn you down either when you need a loan for increasing your business.

You will probably think I have written a book, but believe me, I have not started, but must stop, because we have a big day ahead of us tomorrow and my busiest part of the day is between 5 and 7 a. m., when I dope out the day's work in bed.

Yours for less cents and more miles,  
(Signed) GEORGE R. CARMICHAEL.

### Must Workman Submit to Operation?

(Concluded from page 26.)

for the period of probable disability, in case the operation were successful—ten weeks in this case.

"If this were a serious operation, the courts would hold that Peterson would be justified in refusing it, for the law will compel no man to gamble on his own life. If Peterson decides to accept the operation, we must pay the full medical, hospital and surgical bills, and in addition, we must pay him compensation for the period that he is incapacitated from work, even if it runs twice ten weeks in time.

"Obviously, it would be to our advantage to keep still and pay him ten weeks' compensation, but we feel that the man does not understand the facts and the law concerning the matter, else he would decide to protect his own interests more fully than he has done so to date."

Sanderson did not wait to read the rest of the letter, but jammed his hat on his head and started for Peterson's house. "By crackety," he mumbled, "I guess this will wake him up! If it doesn't, I will!"

### Motor Vehicle Situation in Belgium Stabilizing.

The automobile situation in Belgium is said to be stabilizing itself with remarkable rapidity, although the armistice found the number of automobiles in that country exceedingly low.

Data based on the number of licenses issued during the first quarter of 1914 show the number of cars in Belgium at that time to be 9,615.

# Two Stage *Usaco* Air Compressors

*Mature investigation and deliberation will emphasize the wisdom of purchasing Two Stage De Luxe Air Compressors because, in them, is obtained:*

**High pressure Air in great volume, hence capacity to quickly handle a large number of pleasure car tires or giant truck tires of any size or pressure.**

**Pure air, without moisture or oil, for Usaco Compressors have both filtering trap and automatic air purifier, a new and valuable feature.**

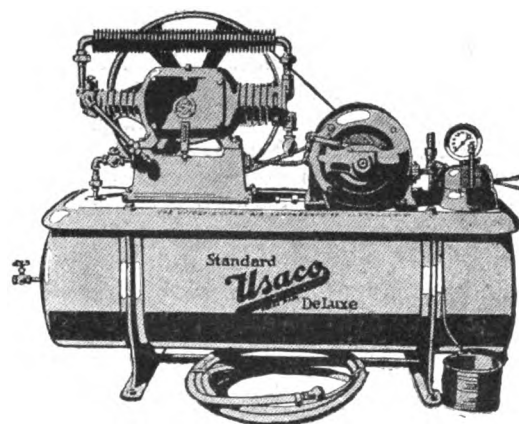
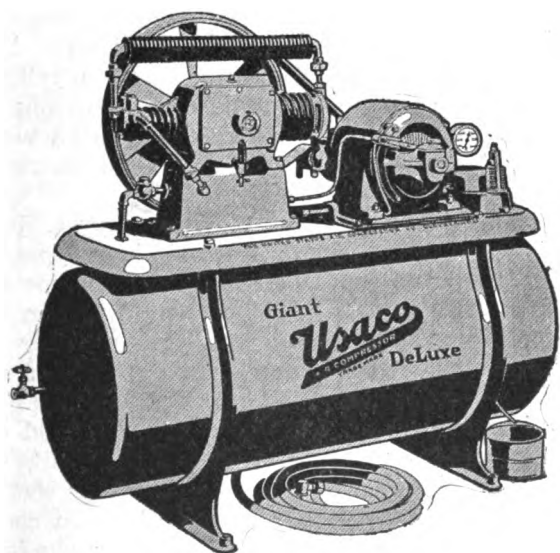
**Capacity sufficient to accomodate rapid growth of business and serve you faithfully, with minimum attention and freedom from repairs for years to come.**

**An outfit that is completely automatic and fool-proof in operation because safeguarded against changing conditions and emergencies.**

**An outfit in which is the cause of burned out motors, blown fuses, etc. is definitely eliminated, because equipped with the Usaco Patented Unloader which permits motor to start without load.**

**An outfit that will not overheat because it is amply lubricated and equipped with numerous cooling fins and fan blade fly-wheel.**

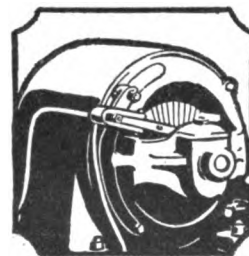
**An outfit selected as the best available by a majority of establishments, the adopted standard of many international corporations, the Government's choice for war service.**



THE two Usaco De Luxe Air Compressors illustrated are the leading units of the Usaco Line, containing machines adapted for every existing need. They embody all the advantages mentioned and differ only in compressing ability and tank capacity.

The **Usaco Standard De Luxe** has a capacity of 4 cu. ft. per minute, and a tank capacity of 30 gallons, suitable for 200 pounds working pressure.

The **Usaco Giant De Luxe** has a capacity of 7 cu. ft. per minute and a tank capacity of 60 gallons, suitable for 250 pounds working pressure. Both units are also furnished mounted on wheels so that they may be easily moved to the cars or other departments, if desired.



Above is illustrated the Usaco Unloading Device, which all familiar with electric motors will appreciate as invaluable and in fact essential to satisfactory operation. It is obtainable only on Usaco Compressors because amply covered by patents.

**The United States  
Air Compressor Co.**  
6542 Carnegie Ave. Cleveland, Ohio

### Sales-Building Ideas.

(Concluded from page 14.)

store on Saturday evening and sales of other items are also effected.

An enterprising hardware dealer in a small, Western town placed a push-button at a convenient height on a post at the curb in front of his store for the accommodation of his automobile trade. When a customer drives up in front of his store, he may announce his presence by merely reaching out of the automobile and pressing the button. The trade appreciates this service and sales have shown a remarkable increase.

In bad or inclement weather, this service feature makes an especially strong appeal. The garage and accessory dealer may do well to adopt the idea and put it to work. This service should be given considerable publicity. The dealer should secure a complete list of all the names of automobile owners in the county and should mail them a specially attractive card announcing the service. It should be played-up strong in the store's newspaper advertising. This service should be the direct means of increasing sales a considerable degree.

Another dealer who keeps a strict record of every customer's purchases through the use of a card record system, goes over this card file at the close of each month and lays out the cards of all customers who have not purchased anything during the month and sends them a message, made out in statement form on a regular statement.

Along with this statement, he encloses a card entitling the holder to a small credit upon any purchase he may make during the month. The customer immediately thinks that he is receiving a statement and is very much pleased when he finds that it is not. The recipient usually appreciates the novelty of the message and calls around during the month.

A central Ohio accessory dealer has added a nice volume of extra business to his sales by taking on a line of electrical household appliances, such as electric washing machines, vacuum cleaners, etc. He found that he could handle this line without any great increase in his cost of doing business and at the same time realize a substantial profit from the sale of this line.

During the quiet season for accessories, he puts forth special effort in this new department and has received

splendid results. At the very start he secured a list of all the homes in his community that were wired for electricity and mailed to each family a circular announcing the opening of his new department and inviting the public to look over his new stock. He kept a careful check on all prospects and as the time was available, called in person upon them and sold a number of appliances.

Another dealer has found garden hose a profitable side line, especially during the spring and summer months. This dealer handles six or seven different grades ranging in price from 8 cents to 18 cents a foot. For displaying his samples of garden hose, he uses a bulletin board about two feet wide and four feet high. Upon this he displays samples of the different grades he handles, using large hooks screwed into the board upon which the samples rest. At the right-hand side of each sample, he has the price marked so people may see just what he is selling it for.

On nice days he sets this board out on the sidewalk where people passing could see that he sells hose and it has brought him in many a sale. During the early summer he circularizes his community, announcing his prices for garden hose and inviting people in to inspect his stock. During the season he disposes of considerable hose and it brings him some nice extra profit.

A central-western dealer mails out a trade letter to each one of his many customers on an average of twice a month. In this letter he treats many subjects; for instance, on one occasion he may discuss the tire market, in another the care of tires, in another motor oil and its effect upon the engine, and various other subjects, always bringing in his goods.

Along with this letter, he encloses some piece of advertising matter which he has had prepared for the occasion or else some of the advertising matter furnished him by the manufacturers. He has found this letter most productive of sales and his trade appreciates the tips he has given.

These are only a few of the many plans and methods the garageman may use in his fight for more business—others will come to him as he thinks along this line.

### The "Expert Driver" Called Motor-dom's Worst Foe.

That the so-called "expert" driver is one of the most exasperating pests

of motordom and is chiefly responsible for the pedestrian's animosity toward the motorist is the editorial belief of the American Motorist, official journal of the A. A. A., which publishes some warnings on the subject in a recent number.

This is how the American Motorist views the "expert":

"Speaking of the 'expert,' we do not think of the painstaking mechanic who, by dint of study and experience gained in actual practice, familiarizes himself with motor cars. Him we would call the 'expert motorist.' But we have in mind the 'expert' driver, nothing else."

Then the article continues by saying that the "expert" is rarely found among the owners:

"Usually he has graduated from the washstand in a garage, while sometimes he is a specimen of the so-called natural-born mechanic—a species that neither mechanical progress nor scientific training seems to have been able to exterminate.

"It is the 'expert' driver who is chiefly responsible for the animosity of the pedestrian against the motorist. It is he who scares old ladies into hysterics while bearing down upon them with a rush, only to clamp on his brakes with a bang and bring his car to a stop half an inch from the pedestrian's shin.

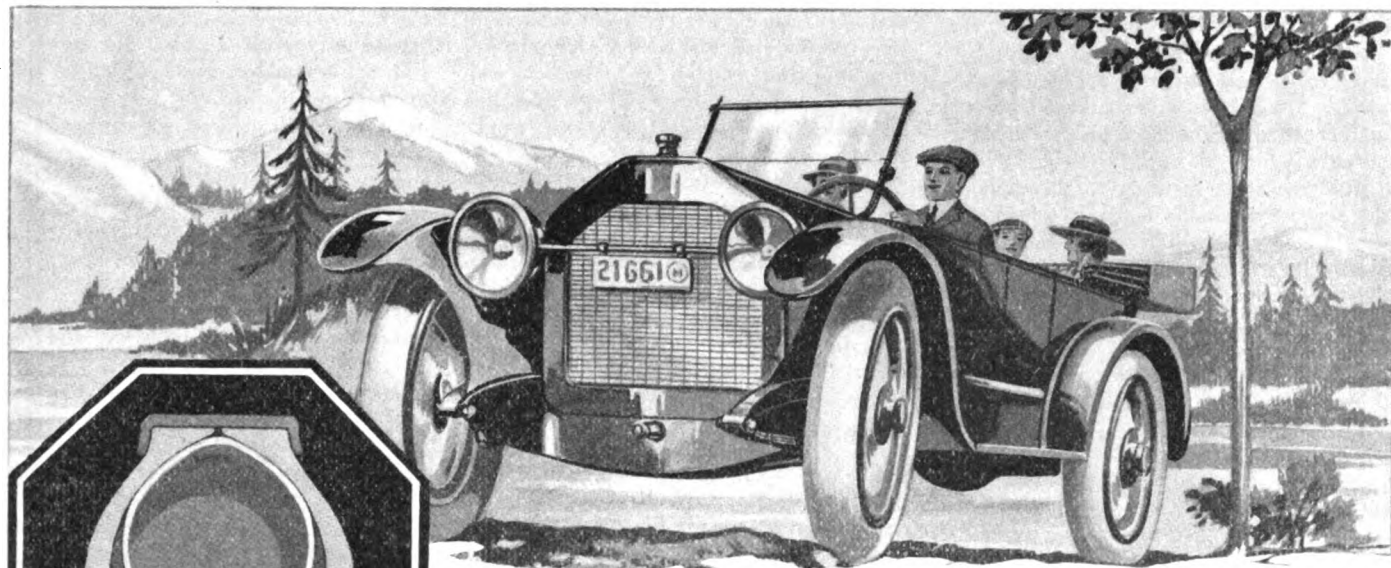
"If you want to watch him, stand in front of a busy garage for a while and you will have ample opportunity to observe his doings. He will come out of the garage at full tilt, clear the opposite curb by ripping the steering gear around with all his might, and disappear around the next corner in similar fashion.

"When he returns, he will rush down the block at a speed of 50 miles an hour, throw on his brakes some eight or ten feet from the stopping point, and bring his car to a halt almost within its own length; all of which, of course, looks very clever to the 'expert' driver and costs money for repairs and excessive deterioration to the owner. This sort of driver is the one to whom an open muffler is music in the ears; who imagines himself a miniature Oldfield."

### Boston Home of the First Garage on Record.

The first garage on record, where motor cars could be stored, repaired and rented was opened in Boston, Mass., in the spring of 1899.





**COFFIELD  
TIRE PROTECTOR**

# No Road too Rough for the Coffield Tire Protector

Almost any make of tire will stand up and give service under ordinary conditions. But the ceaseless bumping and thumping it gets on rough roads tends to reduce its normal mileage.

It is here that the Coffield Tire Protector demonstrates its value. It is made of pure, live rubber, **without fabric**, and fits in between the tube and the casing, with positively no friction.

It absorbs the shocks and bruises that the casing is constantly receiving, and enables the tire to deliver every mile of service that was originally built into it.

The Coffield is not a cure-all, of course. It is just what its name indicates—a protector against tire troubles of all kinds. And this kind of protection means greater mileage for the tire.

It is not sold on the basis of being a preventor of all tire troubles. And yet, it will prevent at least 90 percent of the punctures and blowouts.

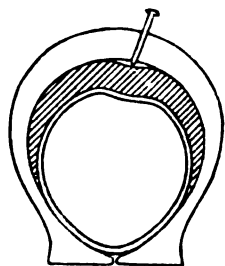
In addition to this, it backs up the casing and protects it against the shocks of the road.

If it does all these things—and it does—that is reason enough for its existence.

One set of Coffield Protectors will outlast many sets of tires, no matter how rough the roads or how hard the usage. Simply take them from the old tires and use them again in the new ones.

Thus they pay for themselves many times over by the trouble they save and the increased mileage they enable the tire to deliver.

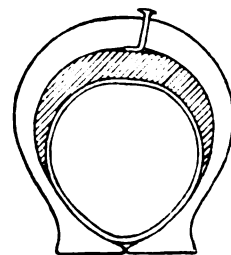
**TO DEALERS:** -If you do not already handle Coffield Tire Protectors, write us for our special proposition and its money making possibilities.



The above shows a nail piercing the outer casing and how the Coffield protects the inner tube.

# The COFFIELD TIRE PROTECTOR COMPANY

## DAYTON, OHIO, U.S.A.



The live rubber of the Coffield Protector (having no fabric) merely gives when the nail strikes it and the nail clinches between the protector and the casing.

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

### How to Install a Forge.

(Concluded from page 19.)

thing to do is to purchase the blower complete. There are several kinds on the market which are made especially for this purpose.

The blower is fastened to the table of the forge by suitable bolts or screws. It should be located within easy reach of the blacksmith's left hand so that he can keep the fire burning evenly while he attends to the heating iron with the right hand. Ordinarily, this is the way to do it, although the arrangement may be reversed if the mechanic is left-handed.

The air pipe leading to the tuyere from the blower may be fastened with a slip joint or sleeve, or it may be soldered. Its size should conform to that of the blower outlet.

If the garage affords a compressed-air system, the mechanic will find it very convenient if the forge is connected to this. He will not have to bother with the blower but can give his whole attention to the fire. All he will have to do will be to turn a valve when the fire needs increasing. It is not always best, however, to connect the forge to the compressed-air line because the forge will be out of commission whenever the air system is not working. The blower is always dependable and is recommended.

In writing this article it is presumed that most mechanics will prefer to make as many parts of the forge as is possible, obtaining the material wherever most convenient. Therefore, no arbitrary specifications are given. However, a few suggestions as to where to obtain some of the different things second-hand may be beneficial.

**First, the brick and mortar:** It is possible to buy the mortar from some bricklayer who is at that time working upon a new building or chimney, and who, no doubt, will be glad to dispose of his surplus mortar, or he can be induced to mix a special batch. The brick can be obtained from the same source.

**The flat iron for the support bars and tie washers** is best obtained from a junk yard where it may often be purchased already cut, as may also the pieces of cast iron for the firepot.

These cast-iron slabs for the sloping walls of the firepot may be made almost to size by drilling a row of small holes close together along the line to be cut and then breaking the piece in two with a sledge. If the slab is placed with the holes directly over a solid body, such as an anvil, and given a sharp blow, it will usually break squarely through the holes. The ragged edge of the broken holes may be readily made smooth on an emery grinder.

The hole for the grating in the bottom slab may be made in much the same way as the side walls. The holes are drilled in a circle of the desired size, in this case about three inches in diameter. The sec-

tions between holes are cut out from both sides of the slab with a sharp chisel until they are weak enough to be broken with a hammer. It is not necessary to smoothen the broken edges of this hole as it works as well without.

The side and bottom slabs of the firepot may be almost any thickness, but preferably over half an inch; the thicker they are, the less the danger of burning and distorting. And the thicker they are, the more will they protect the cement body of the table from the fire.

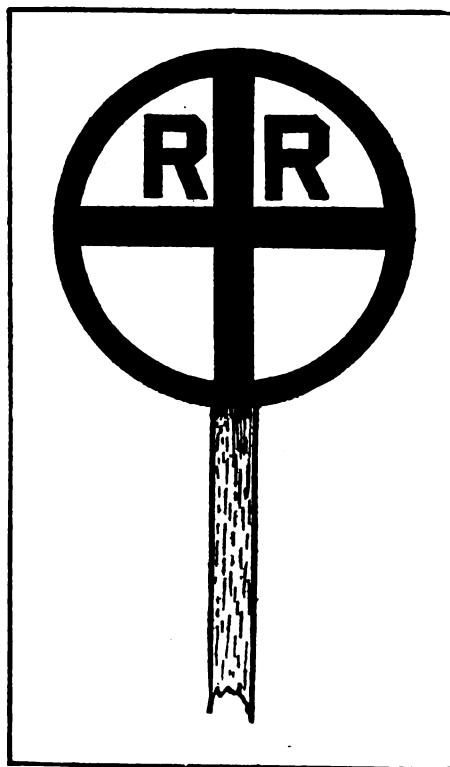
For the air system, the mechanic may utilize common galvanized drain pipe which he can obtain at any tinship, or at the hardware stores. If he be particularly handy with tools, he can roll the air pipe out of sheet iron. If he wants to make the tuyere more substantial, he can use steel tubing and a tee as previously suggested.

By referring to the accompanying drawings, the garage mechanic should be able to construct a very good forge with which he can do many classes of blacksmithing.

### Warning Signals to Be Posted at Railroad Crossings.

Grade crossings on the Pennsylvania Railroad, in the states of Pennsylvania and New York, are soon to be safeguarded with protective warning signs giving advance notice of approach to the crossings. It is said that the work of installation will start at once and will be extended to other states, where preliminary warnings are not now in use, as soon as the necessary approval can be obtained from the authorities.

The new "approach" signs will be



New Railroad Warning Sign.

placed, as nearly as practicable, 300 feet from the crossings in both directions, and will be located on the vehicle, or right-hand side of the highway. The exact point of location will be determined in each case with a view to giving the greatest visibility and prominence.

### Tractor Repairs.

(Concluded from page 23.)

gives a pulling power on both the internal and external disks, which, in turn, gives you pulling power on both left and right bull wheels.

**B-44, or B-215, is the transmission gear.** This is always in mesh with the crankshaft gear, B-133, and when the clutch is released, the transmission gear runs perfectly free.

**B-47, or B-213, is the external clutch disk, and when the clutch yoke, B-132, is pulled back, it releases the clutch by compressing the spring, B-69, and at the same time, the external clutch disk is pulled out away from the transmission gear, B-44 or B-215, thereby releasing it.**

If when the clutch lever is latched, the tractor creeps forward, it indicates that the clutch is not fully thrown out. This can be remedied by taking up slack in the clutch rod by tightening nuts on front end, first being sure that the clutch release rod is brought way back when the clutch shifting lever is latched.

If, when the clutch shifting lever is unlatched, and the clutch thereby thrown in the tractor pulls on one bull wheel only, it is a sign that the clutch rod is too tight. This trouble is overcome by loosening nuts on the front end of the clutch rod just enough so that the nuts do not press against the clutch yoke, B-132, when clutch is let in.

If this adjustment is made properly, the clutch handle when let forward will leave the clutch in, so that it will pull on both bull wheels and when brought back and latched, it will release on both bull wheels.

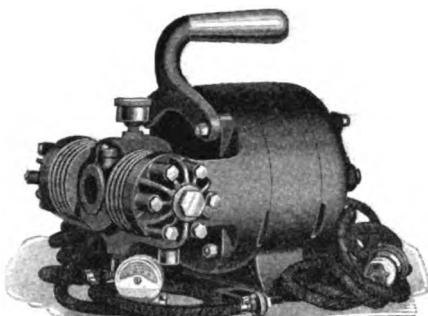
### Chains.

The chains used in connection with tractors employing trucks should be removed when overhauling and carefully examined for loose pins, broken rollers, and seriously worn links. New parts should be put in at once as defective parts cause undue strain which may damage the entire chain and sprockets.

Clean the chains thoroughly and then immerse in a solution of three parts of beef tallow and one part of graphite. Before putting them back into place, wipe them well to prevent gathering of dust, grit, etc. The chains should be adjusted so that they don't slap but not so tight as to bring undue strain upon them. Cutting on the inside of the plate is a sign that the sprockets are not in line.

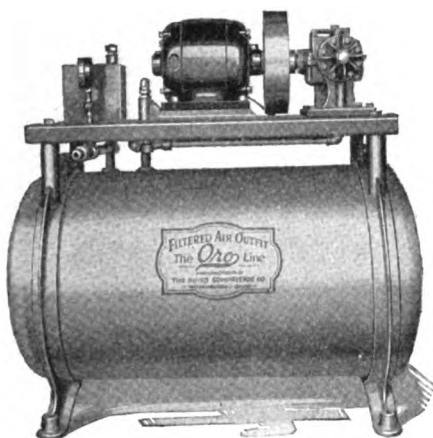
Whenever it is necessary to replace a chain because of wear, it is best to put on new sprockets as well for the worn sprockets will not fit the new chain.

# Air Compressors for Every Garage!



**The Famous "No. 10"**  
"Carry it in your hand!"

A complete outfit, yet it weighs only 35 pounds. It has motor, compressor, hose, gauge, and gives a pressure up to 100 pounds, supplying 2.61 cubic feet of air a minute.



**The "Filtered Air" Outfit**

This perfect outfit is meeting the approval of all garages and motor car owners. It supplies air that is absolutely free of oil, dust and dirt. A complete outfit, ready to use. This outfit also is supplied with large wheel casters, if desired.

Our guarantee also will interest you. We replace any parts free of charge, no matter what may have caused trouble. We have been building several thousands of these machines every year for the past twelve years and have never yet charged a cent for repairs of any kind.

Buy an Oro Air Compressor and be sure! Write us for information. We manufacture a large line of superior automobile accessories, in addition to the full assortment of compressors.

**The Au-To Compressor Co.**

304 S. Mulberry Street

Wilmington,

Ohio

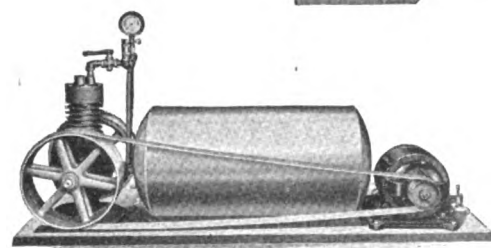
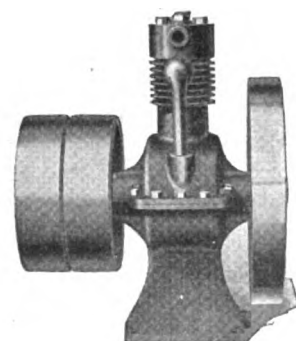
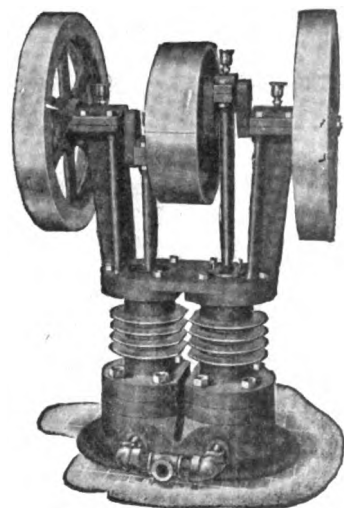
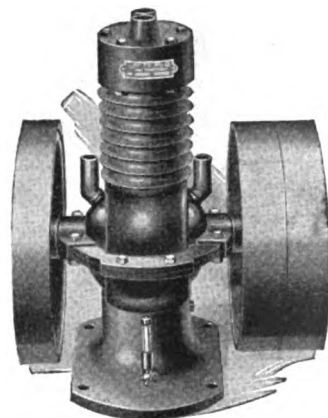
**W**HEREVER automobiles are known, Oro Air Compressors are used. They mean the most economical, most reliable source of air. These claims have been proved by hundreds of thousands of these machines in daily use.

There is an Oro Air Compressor for every garage—public and private. Large outfits that will provide air in abundance for any number of cars; medium sized outfits for ordinary garages; and small outfits for the one or two men shops. There also is the No. 10 for small public or private garages and for spraying and air brush work.

Remember the Name



To buy an Oro Air Compressor means to secure the best outfit that can be manufactured. The quality of materials, the care and accuracy of the workmanship, and the superior design of the Oro, mean better satisfaction and a longer life of service.



# Farm Automotive Equipment News

## Oil Film a Certain Protection to Tractor Parts.

It was said ten years ago, that the greatest number of tractor troubles was caused by faulty lubrication, and this statement, in the opinion of many tractor service chiefs, still holds good. An adequate film of oil and grease must separate the working parts of the tractor, and the first and most important work of the tractor operator is to see that this film is maintained while the machine is in operation. Of course, it is better to stop work for a few minutes to apply oil or grease than to operate the machine to its detriment when oil is needed.

When the tractor leaves the salesroom for the farm it should be accompanied by a chart showing how, when, and where to apply oil and grease, and the kinds of lu-

student will be required to become familiar with the different machines. Ignition, valve and spark timing, carbureter adjustments, brake and fuel-consumption tests, lighting and engine trouble work will be among the things emphasized in the courses. Actual adjustments and repairs on trucks and tractors will also be a part of the work.

Each school will run for four weeks; the first opened February 2, and the second will begin on March 1.

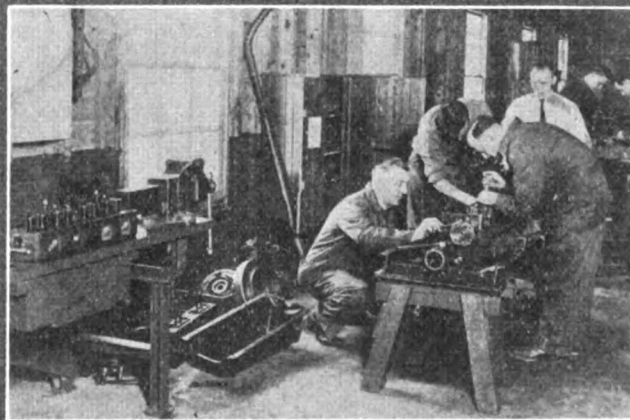
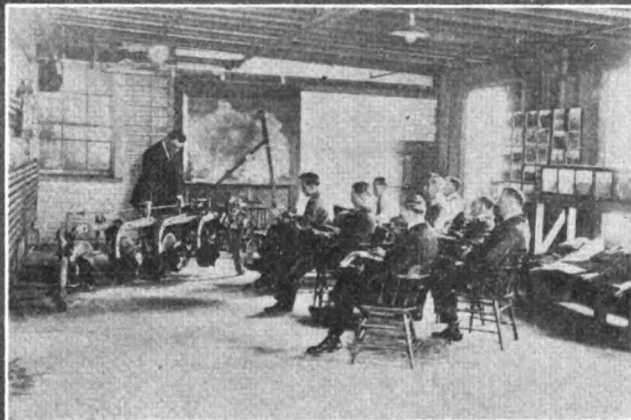
## Power Farming School Operated by Cleveland Tractor Co.

Although the tractor industry is still young and comparatively undeveloped, it has shown such certain promise of expansion and profit that high grade men from almost every line of industry are

so that each major unit of the Cletrac is studied first by itself and then in its relation to the whole tractor. There are separate classes in the motor, the transmission and differential and the side frame construction going on at the same time.

The second week at the school is devoted to a study of soils, farm methods, and farming economies. Students are taught to prepare a good seed bed, lectures and practical operating experience being used. They are given a thorough knowledge of all of the more important tillage, cultivating and harvesting implements and when weather permits, go to the experimental farm and use these power-farming tools under actual farming conditions.

During the agricultural lectures and experiments, the Cletrac is wholly subordinated to the study of practical farming.



The Classroom of the Cleveland (Cletrac) Tractor School—View of the Shop Where the Men Are Taught How to Repair the "Cletrac."

bricant suitable for the several parts. Tell the buyer to keep the oil at the proper level in the crankcase, the other parts oiled up once every four hours, and the grease cups turned down to make sure that the grease is reaching the parts.

## Agricultural College to Have Truck and Tractor School.

Truck and tractor schools which are to be conducted by the farm mechanics' department of the Michigan Agricultural College during February and March are expected to draw an even larger enrollment of farmer-students, than in previous years.

The constantly increasing use of gasoline power in farm work and the need for adequately trained men to handle the machinery, have made the motor schools among the most popular of the special winter agricultural courses.

At least a dozen makes of tractors will be used during the school term, and each

eagerly seeking a place in the tractor business. These men are already competent salesmen, but they are generally unfamiliar with tractors and almost without exception, they lack the fundamental knowledge of tractor farming so necessary to success in the tractor field.

To meet this situation, to teach new salesmen quickly and thoroughly, and at the same time to provide a comprehensive course of instruction for new service men and even for owners, the Cleveland Tractor Co. has established the Cletrac school at Cleveland, Ohio.

The objects of this school are: First, to impart a thorough working knowledge of the Cletrac's construction, operation and maintenance; and second, to teach the fundamental principles of tractor farming, subordinating the Cletrac to the more general subject of mechanical power on the farm.

The course, which is conducted by practical men of experience, is further divided

but its complete tractor farming service is emphasized during the operations of the implements studied.

The school is open without charge to all who are interested in the sale or use of the Cletrac.

## Tractor Courses in California Schools Prove Popular.

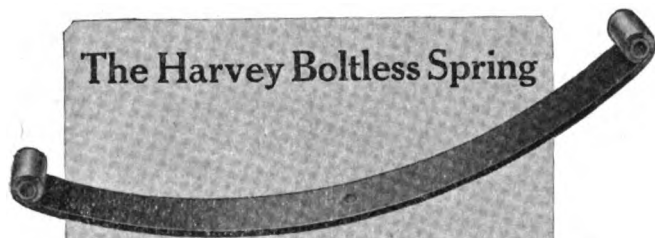
The call for tractor operators far exceeds the supply of good men, and schools conducted by the University of California and private institutions in that state appear to be doing their best to turn out well-equipped men to supply the demand.

The short tractor courses offered by the University of California generally extend over a period of six weeks, and are as thorough as possible, considering the time of instruction. Both night and day sessions are held, and from four to six instructors lecture and demonstrate. Six to twelve makes of tractors are used.



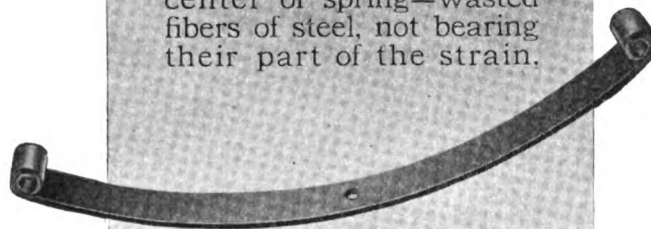
# Unbroken Lines of Strength in the Harvey Boltless Spring

## The Harvey Boltless Spring



An indentation forged hot to force a bead on opposite side of leaf is the means of holding leaves rigid in the clutch of the spring clip. Thus the "lines of strength" are unbroken. No hole anywhere. Fibre of steel is unbroken—no metal removed. This is the Harvey way.

## The Common Spring



At the center, where the spring bears greatest strain, is the weakest spot caused by punching a hole to accommodate a bolt, the common method of spring fastening. The "lines of strength" are broken by the hole in center of spring—wasted fibers of steel, not bearing their part of the strain.

**T**WO methods were employed to make the Harvey Spring excel in strength so that a broad guarantee could be offered safely with every sale. The center hole was eliminated so there are no weak spots. Then the Harvey patented process of heat treating and tempering was solved. These two factors have made the Harvey known in motor-dom as a spring in which the motorist can place utmost confidence.

Dealers are invited to write for the Harvey book containing specifications for over 1000 kinds of Harvey Springs; also for information regarding our dealer co-operation.

**Harvey Spring & Forging Co.**  
1042-17th Street                      Racine, Wis.

No longer need automobile spring sales mean added responsibility and eventual trouble for the dealer. He can sell the Harvey Boltless Spring with a guarantee that really protects. Also he can assure resilience that gives the motor car extreme riding ease and eliminates the jolts that wear down tires and mechanism prematurely.

**Harvey**  
**RACINE**  
BOLTLESS  
AUTOMOBILE  
**SPRINGS**  
Easy Riding—Guaranteed

# Garage Equipment for Better Efficiency

## Five-Gallon, Quick-Return, Rapid-Delivery Filling Pump.

The Milwaukee Tank Works is manufacturing an outfit which provides a fast, hand-operated method of filling motor cars—a rapid-delivery, five-gallon, continuous-motion speed pump.

The pump is handsomely finished in a hard-baked enamel with nickel trimmings. Adjustable measuring stops enable the operator to draw accurately one, two, three, four or five gallons at a single stroke. The measuring stops can be sealed to prevent tampering with the measuring device.

A gallon recording meter keeps an accurate record of every gallon pumped, up to a million gallons, then repeats. It cannot be set. A very large discharge register indicates each gallon pumped up to 20 and is set back to zero before starting.

The tank is built by the well known Milwaukee "Kant-Leek" process, of galvanized steel, very closely riveted and soldered, and bears the Underwriter's label. It is fitted with a filling pipe, having automatic vent valve, lock and removable strainer. A measuring gage stick is included.

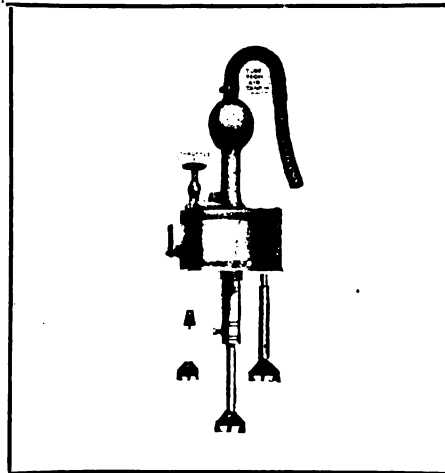
Write to the Milwaukee Tank Works, Milwaukee, Wis., for further information and prices, mentioning the American Garage & Auto Dealer.

## Pneumatic Valve Grinder Which Embodies New Principles.

The pneumatic principle and throttle control of the Veltum pneumatic valve grinder, manufactured by the Warnock-Worth Co., is said to give the operator any speed from 50 to 1,000 strokes per minute, making it unnecessary to go over valve a second time; it does the entire job on a

valve without stopping, and operates on 50 to 500 lbs. of air from any air tank.

It also develops plenty of power to grind any size valve, fits over-size valve stems into valve guides, grinds valve cages as



The Veltum Pneumatic Valve Grinder.

well as valves. Quickly relieves stuck valves, does very delicate work, such as grinding carburetor float valve stems and fuel system valves, grinds valves that have no provision for tool to fit in head, and grinds eighth-valve on Ford engines.

The Warnock-Worth Co. Sales Dept., at 624 South Michigan avenue, Chicago, will send trade prices and more detailed information to those writing them mentioning the American Garage & Auto Dealer.

## New Compressors Designed by Curtis to Meet 1920 Needs.

Two complete and interesting booklets on Curtis air compressors have just been received. In detail, they describe the new style "V" and style "Y" outfits manufactured by the Curtis Pneumatic Mch. Co. for the 1920 season.

The style "Y" outfit, the makers state, is built to answer an insistent demand on the part of garage and jobbers for a small portable outfit for direct pumping. The "Y" outfit is always made geared, not belted, not intended for continuous duty nor for tank service. The makers also state that the outfit is practical, inexpensive, convenient, and thoroughly dependable.

In five sizes is the style "V" compressor. It has a controlled splash oiling system, is air-cooled, and has a belt fan flywheel and belt

tightener, or comes with cut flywheel gear, rawhide pinion and gear guard, as the purchaser may desire.

The Curtis Pneumatic Machinery Co., St. Louis, Mo., will be glad to send copies of the booklets and further particulars to those interested. Mention the American Garage & Auto Dealer.

## Protexall One-Piece Suits for Garagemen and Shop Mechanics.

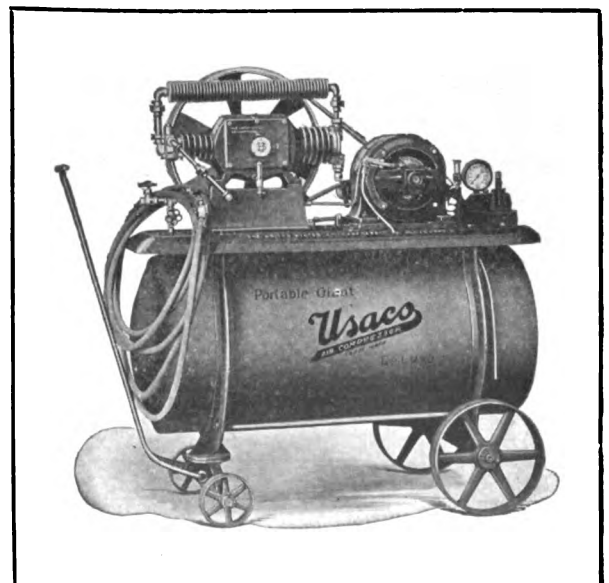
Here is something new that is sure to appeal to garage mechanics and other workers around the shops—a Protexall one-piece suit with a special "spring back," guaranteed by the manufacturer to eliminate pulling and binding across the shoulders, chest, and seat.

Overall manufacturers seldom go beyond labeling their goods for identification purposes, but these garments are always sold in individual boxes bearing the name and trade mark, and stamped with the size of the garment. This serves a two-fold purpose—the name stands out prominently on the box, so the buyer knows he's getting Protexalls, and the suit is sure to be clean and fresh.

The manufacturer, Protexall Co., Abingdon, Ill., will be glad to give further particulars about this useful suit. Mention the American Garage & Auto Dealer when you write.

## New Portable Giant Air Compressor Announced.

In line with its progressive policy, the United States Air Compressor Co., of Cleveland, Ohio, has just announced a portable air compressor of the giant two-stage type. While newly designed for



The New Giant U. S. Air Compressor.

## Inquiry Coupon.

Readers of this paper are invited to ask us for information concerning anything described in its pages or about any motor vehicle parts or accessories. This information will be furnished whether or not the requests come from subscribers.

American Garage & Auto Dealer,  
116 S. Michigan Avenue,  
Chicago, Ill.

Please supply me with information as to trade discount and nearest source of obtaining the articles given below:

.....  
.....  
.....

Name.....  
Address.....

## THE ROSE TIRE PUMP

*is the Tire Pump  
Equal to the Task*

The big truck tires are becoming more numerous daily. A dependable Tire Pump is the most carefully selected part of the equipments, that's why 98% of the Truck owners are partial to the **ROSE TIRE PUMP**.

**Over 2,000,000 ROSE TIRE PUMPS**

in use today and but 44 replacements in 1919. The patent valve is responsible for the **ROSE** being the easiest pump to operate.

**ALL DEALERS AND JOBBERS**

TWO SIZES {  $1\frac{1}{4}$ " all steel construction . . . \$3.00  
                  {  $1\frac{1}{2}$ " all steel construction . . . 3.50

Manufactured by

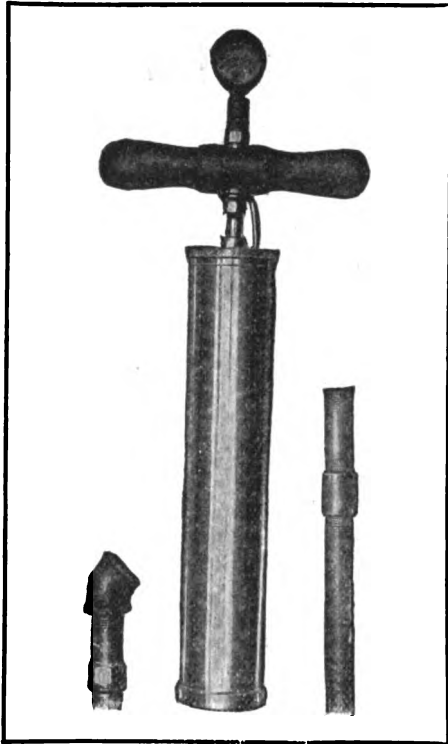
**Frank Rose Manufacturing Co.**  
HASTINGS, NEBRASKA



The  
**VALVE**  
is the  
**REASON**

Give the **AMERICAN GARAGE AND AUTO DEALER** Credit When Writing Advertisers.

portability, the compressor itself is not entirely new as it has been on the market for about two years and is an evolution of, and improvement upon the standard De Luxe compressor, thousands of which



The Hempy-Cooper Motor Tester.

have been in successful operation for some time.

The manufacturer claims this unit is particularly adapted to meet the heavy demands now existing by reason of the enormous increase in the number of automobiles and the inflation of heavy-truck tires now in common use, which require higher pressure than ever before known.

A further definite advantage of this machine, the maker says, is the ease with which it can be moved to the trucks, which by reason of their large size cannot be as easily manipulated to suit the fixed location of a stationary plant as can the usual small passenger car.

### Motor Tester Diagnoses Trouble Without Motor Running.

To the garageman who realizes what a saving it means in money and time both to himself and patrons to be able to positively diagnose his customer's motor trouble, in a few minutes, without even running the motor, the Hempy-Cooper motor tester, exclusively distributed by the Fairbanks Co., should prove very attractive.

In using this tester, all spark-plugs are removed and the device screwed into the spark-plug opening. After a complete test of No. 1 cylinder, the operation is repeated in each succeeding cylinder until the whole motor has been tested. All tests on each cylinder are made without changing the position of the tester. The different methods of procedure to test compression,

piston rings, valves, piston slap, wrist pins, connecting rods and main bearings, are all very simple.

For example, to test for piston slap, the motor is turned 30° past top centre so that connecting rod will be at angle. The plunger is then worked up and down with a short stroke. If the piston is loose a clattering noise will be heard as the piston moves from one wall to the other. If the trouble is not a piston slap, it is said to be a matter of only a few minutes before one of the other equally easy tests locates it positively.

The test for compression loss serves as an illustration of the simplicity with which the different tests are made. The tester handle is pushed down and the hook fastened in the opening. The motor is turned two complete revolutions by hand; the gauge will then indicate the number of pounds compression in the cylinder.

The tester is simple in the extreme, consisting mainly of an ordinary plunger pump with a hollow plunger to allow the compression to register on the attached gauge. An instrument with so few movable parts is practically immune to wear and should prove very durable.

The Fairbanks Co., Broome and Lafayette streets, New York, N. Y., will send descriptive matter and trade prices concerning this tester to those writing them, mentioning the American Garage & Auto Dealer.

### New Romort Air Station Recently Placed on Market.

The new Romort Air Station which has just been put on the market by the Romort Mfg. Co. certainly fills a long-felt want for a fitting successor to the dirty, grimy and usually broken curbstone air hose and the bothersome old water bucket.

It stands eight feet from the ground to the top of the electrically lighted globe. The base and the cylindrical standard are both of heavy metal construction and are of hollow design for the accommodation of the air compressor in the base and the air hose, water hose, and electrical conduit in the standard.

One of the more important features is the continuous hose from the base to the tire.

Write to the Romort Mfg. Co., Oakfield, Wis., for circulars and trade prices. Don't forget to mention the American Garage & Auto Dealer.

### Complete Ford Tool Set for Overhauling Motor.

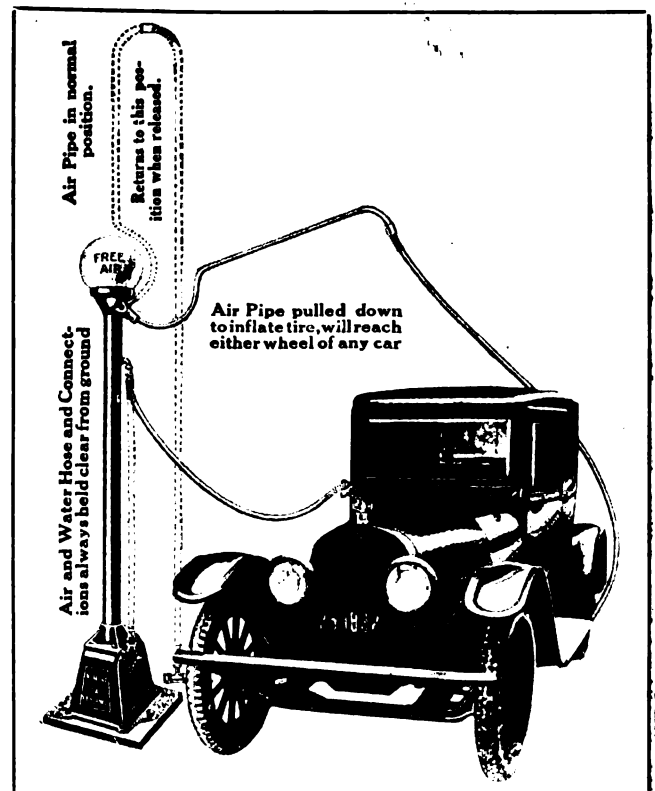
Ford owners everywhere have longed for tools with which to do the work of overhauling, cutting out the carbon from the valve seat and from the valve face.

The "Little Sioux" Ford tool set, manufactured by Albertson & Co., is especially designed and built for the Ford motor. It includes these tools:

The "Little Sioux" Ford valve grinder, which is said to combine true mechanical working principles with the utmost ease and smoothness of operation: a simple turn of the handle gives the valve the reciprocating motion which is necessary to perform good valve grinding. It also automatically advances the valve periodically on its seat by alternating a full turn in one direction with a three-quarter turn in the opposite direction. Thus, it gradually completes the circle and insures an even grind, which means a perfect contact of all parts of the valve with all parts of the seat.

A valve-seat reamer, which insures accurate grinding of valve seats and makes perfect fitting valves. It is made at the correct angles, the manufacturers say, to seat the valve perfectly. The reamer shank keeps the reamer perfectly centered and insures accurate cutting.

An illustrated booklet, which gives photographs and instructions to make the work of rehauling simplicity itself, will be sent to those writing the company concerning the Little Sioux outfit. Address: Albertson & Co., Sioux City, Ia.—and don't forget to mention the American Garage & Auto Dealer, 116 S. Michigan Ave., Chicago.



The Romort Air Station That Fills a Needed Want.



**BRUNNER**

## To Meet A Certain Condition

In the cramped quarters of oil stations—small vulcanizing shops or tire and accessory stores, the hum of gears may be objectionable. If so, a belt-driven, ultra-quiet, compressor outfit is the natural choice.

BRUNNER engineers have met this need by developing a special model.

No. 742 Motor-belt-driven assembled outfit is compact—complete, dependable and economical. Just fits the space available in a small establishment, and yet large enough to give satisfactory service in garages serving many cars a day. This is but one of the many BRUNNER models.

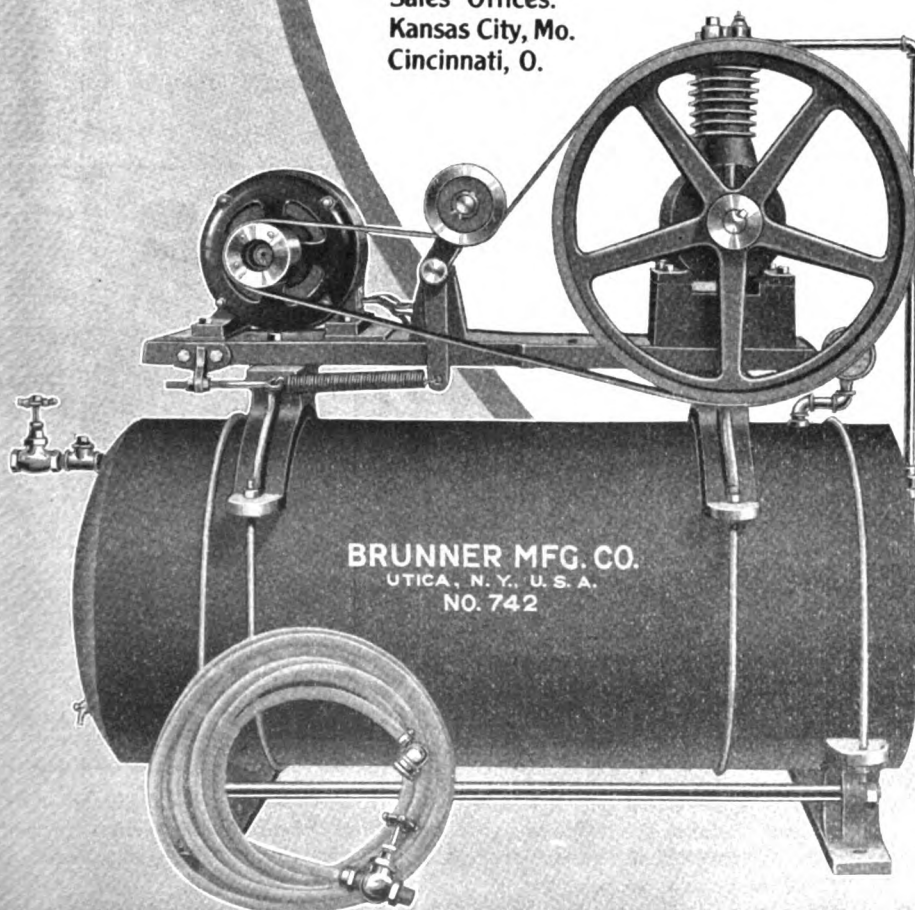
Write to-day for new catalog showing complete line of BRUNNER compressors and outfits.

### Brunner Manufacturing Company

Works and Main Office, Utica, N. Y.

Sales Offices:  
Kansas City, Mo.  
Cincinnati, O.

Put your air  
problem up  
to Brunner.



# Accessories — They Bring in Money

## What Is the Over-Land-Guide for Controlling the Ford?

The Over-Land Guide is a device which bolts to the center of the front axle and the center of the spindle connecting rod or tie rod, relieving the vibration and strain in the spindle connecting rod (or tie rod) and the entire front system, including the steering mechanism up to the steering wheel.

The Over-Land Guide controls the running of the Ford car and holds it in place. In doing so, it removes the strain from the steering mechanism as well as from the arms and shoulders of the driver.

When a Ford car is equipped with an Over-Land Guide the driver can guide the wheel with the tips of his fingers while the car is in motion over the roughest roads, without danger of losing control.

It is a well known fact that many parts of the Ford are damaged from shocks and jolts and there is a possibility of a wreck when the driver loses control. The following are some of the parts saved from the expense of repairing and the loss of the use of the car while it is being repaired:

The Over-Land Guide will save at least \$30 a year in tires alone by overcoming the wobbling and scooting.

The bending of the spindle connecting rod (or tie rod) and axle.

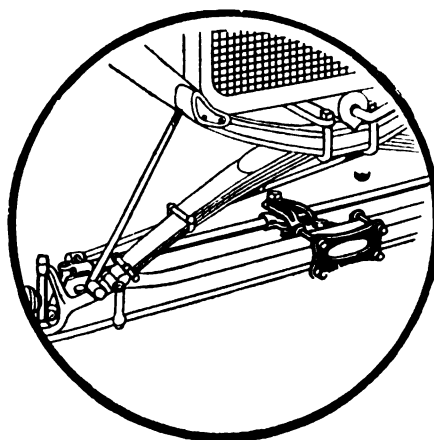
The bending of the right and left spindle body (or knuckle) arms and the hub.

The steering gear connecting rod that is bent and destroyed and becomes locked over center travel of the steering gear ball arm in short turns, which means the locking of the front wheels and the loss of control, which often causes a collision or being thrown into the ditch, or up against

bushings, which are used up or worn out on account of the jerking and wiggling of the front wheels.

The destruction of the crankcase by relieving the strain on the crankcase from the radius rod caused by the jars and jolts coming from the front axle.

The steering post bracket bolts which are



Over-Land Guide In Place on Ford.

loosened and lost on account of the jars and jolts.

The steering gear internal gear case and bushing, steering gear drive pinion and steering gear pinions, which are worn and destroyed from the strains of steering, caused by jars and jolts.

The collapse of the front wheels and saving of the wheels' ball bearings.

Serious accidents that are common from blow-outs. In case of a blow-out in one of the front tires, the wheel with the flat tire acts as a pivot, throwing the car to that side, sometimes landing in the ditch, or causing a collision, with the possibility of the destruction of the car and the lives of the occupants.

It is said that the Ford cannot run its maximum speed on account of being too light. This is not so. The reason for this conclusion is that the front wheels wobble and scoot when out of alignment, preventing the rear wheels from following properly. The Over-Land Guide overcomes this trouble.

The Over-Land Guide will save at least ten times its cost in one year in repairs

alone, where a Ford car or truck is in constant use, besides the extending of the life of the car and the protection to the lives of the occupants.

"The Over-Land Guide is guaranteed to

do all we say. Use it for twenty days properly installed and if at the end of that time you are not satisfied return it and your money will be refunded."

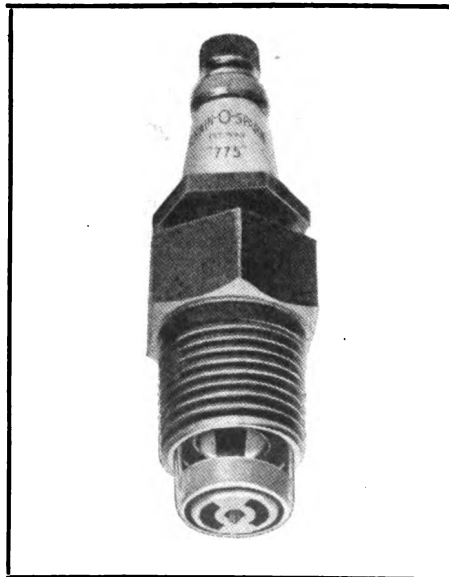
This is a certain selling accessory because of the principles on which it is built and because it furnishes a sturdy, reliable method of controlling the Ford. The policy of the company in standing back of each and every Over-Land Guide is further indication that it is going to prove a popular accessory.

Write to the Meixell Co., 216 Board of Trade, Indianapolis, Ind., and ask them for further information and trade prices, and mention the American Garage & Auto Dealer.

## Chain O' Spark a Spark-plug of Super-construction.

The Chain o' Spark Corp. has just put on the market a line of plugs which are built on new principles of spark-plug design and construction.

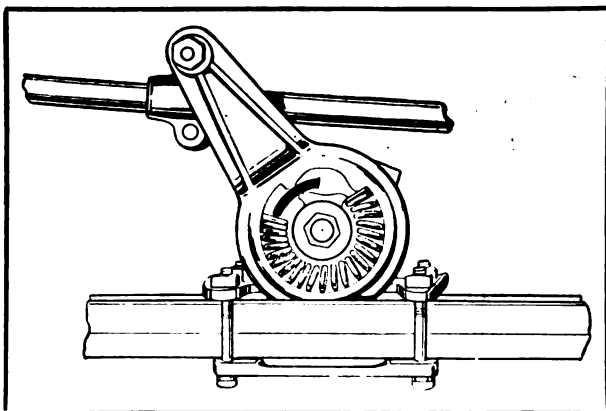
The new plug, the makers state, has double circular gaps and delivers two sparks. This ignites the mixture at two points, assures better combustion, quicker action, steadier pulling, greater flexibility, quicker starting and smoother running when cold. The gaps themselves are separated by a neutral disc which acts as an intensifier and creates the thermo-electric condition that keeps the plug clean, even in an oily and foul cylinder. The electric current jumps from the central elec-



A Sparkplug of Super-construction.

trode (wire) to this disc, and, intensified, from the disc to the shell. On a coil, both of the circular gaps blaze with a blue-white electric flame.

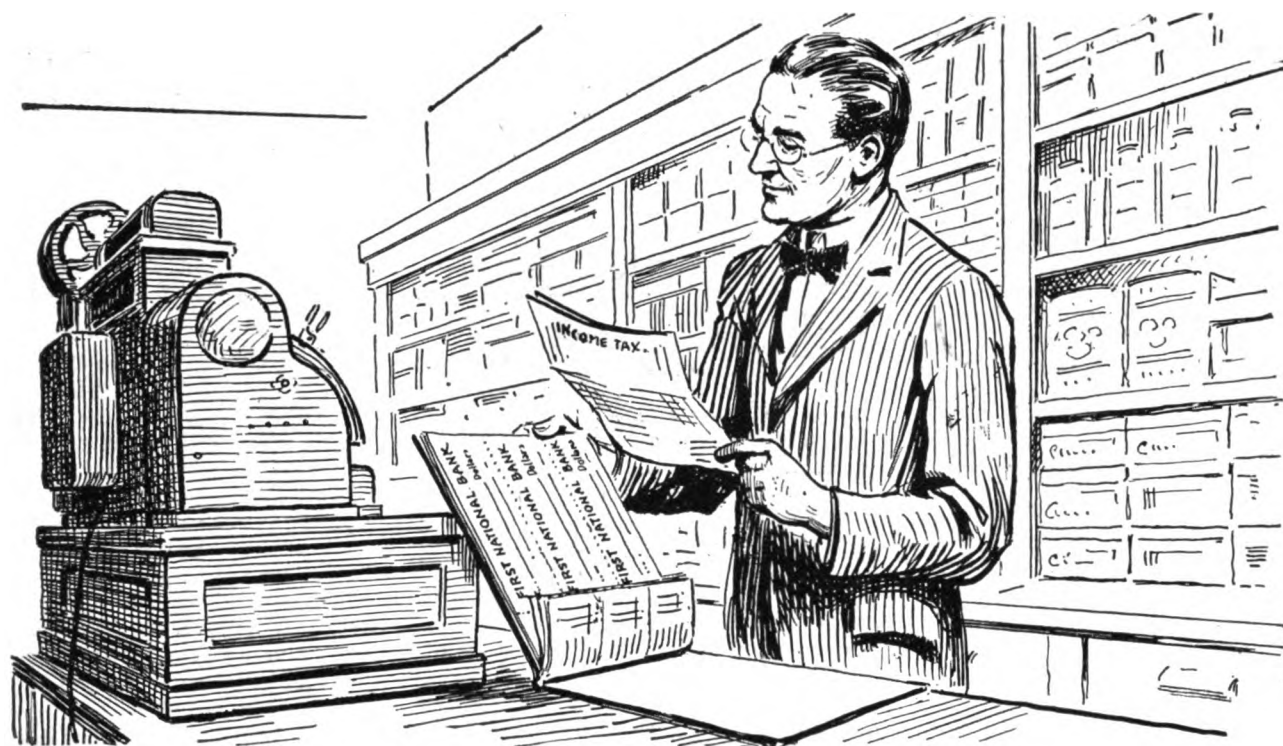
After 18 months of experimentation, a



Guide Assembled Showing Spring Construction.

the curb or other solid obstacle, which sometimes terminates in the destruction of the entire car, as well as the lives of the occupants.

The ball and socket joints, pins and



## This merchant finds it easy to make out his income tax report

**H**E has a checking account at the bank and he uses an up-to-date National Cash Register.

From his bank check book and his bills he gets the cost of running his store, cost of merchandise bought, and a record of payments made.

From his National Cash Register he gets a record of ① cash sales, ② charge sales, ③ received on account, ④ petty cash paid out, and ⑤ clerks' sales.

These records give him control over his business every day of the year.

This merchant knows that his register records are complete and accurate, whether they are made when business in his store is quiet or when there is a rush of selling.

Without an up-to-date National Cash Register, these necessary figures would be hard to get, hard to keep, impossible to verify, and expensive to record.

**An up-to-date National Cash Register will give you the records you need to control your business.**

The National Cash Register Company  
Dayton, Ohio

Offices in all the principal cities of the world

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Digitized by Google

metal was secured which the makers guarantee not to warp and buckle under the heat of a motor and to resist the electric erosion produced by the Chain o' Spark. The porcelain is of Frenchtown 775 and has been tested to a dielectric resistivity of 1192 deg. Fahrenheit.

Write to the Chain o' Spark Corp., Northwestern building, Minneapolis, Minn. An illustrated folder and trade prices will be sent upon request. Don't forget to mention the American Garage & Auto Dealer when you write.

### Bumper for Overland-4 Combination of Strength and Beauty.

The Wayne bumper for the Overland-4 is a new invention just placed on the market by the Wayne Bumper Co., Fort Wayne, Ind.

The most advanced ideas of bumper construction have been embodied in this accessory which is the outcome of the combined efforts of two expert mechanics of the Ft. Wayne Overland Co.

Representatives of the Willys-Overland Co. have fully endorsed the Wayne bumper and say that it meets every requirement of strength and beauty. It is of simple construction, strong and durable, looks neat and is easily attached. It is something besides an attachment, the manufacturer states, as it gives a finished appearance to the car. All of the bolts, braces, etc., are covered by the pan covering the springs and one gets the impression that the bumper is an original part of the car.

### The New Burd Quick Seating Piston Ring.

There has long been a demand from garages and repair shops for a piston ring having the quick-seating feature of a narrow ring, combined with the wall pressure tension of a wide ring. These advantages are said to be combined in the new Burd

cylinder wall, in about 45 minutes.

In automobile cylinders, that have been run for some length of time, the inside cylinder walls attain a hard, glass-like surface. The piston rings attain a similar surface, which is desirable and necessary for obtaining maximum efficiency.

A ring  $\frac{1}{4}$ -in. in width has an expansive



The New Burd Quick-Seating Ring.

torque of approximately 12 lbs., which gives for each  $\frac{1}{16}$ -in. width, approximately 3 lbs. torque. Reducing the contact surface of the ring, by grinding a channel in the central face of the ring,  $\frac{3}{16}$ -in. wide and approximately .002 in. depth, a bearing edge is thrown up on each side of the face of the ring approximately  $\frac{1}{32}$ -in. in width, and thus the entire expansive torque of 12 lbs. is focused against a bearing surface approximately  $\frac{1}{16}$ -in. wide, as against  $\frac{4}{16}$ -in. ( $\frac{1}{4}$ -in.) for the surface of the ring were it left plain. In the Burd piston rings, the unit of expansive torque per unit of contact against the cylinder walls is increased from 3 lbs. per  $\frac{1}{16}$ -in. to 12 lbs. per  $\frac{1}{16}$ -in.

The wear-away quality of the gray cast iron of the piston ring in contact with a similar metal of the cylinder wall, lubricated by the oil film which the channel carries, therefore, is much greater than if the entire  $\frac{1}{4}$ -in. of the face came in contact with the cylinder wall, and seating is accomplished in approximately  $\frac{1}{5}$  of the time, or less, required by the conventional ring.

The Burd ring is made of high-quality, dense, tough, gray iron. It is ground to micrometric accuracy of twenty-five hundred thousandths of an inch, exceptionally resilient, and exerts an unvaried wall pressure.

Write to the Burd High Compression Ring Co., Rockford, Ill., for further particulars and prices, mentioning the American Garage & Auto Dealer.

### Johnson Gasolene Strainer for Ford and Maxwell Cars.

Within the pocketbook reach of every Ford and Maxwell owner is a gasolene strainer manufactured by the Johnson Co. The makers state that this strainer prevents leaky carburetors and can be installed in a few minutes. It traps dirt and sediment before it can lodge on the inlet needle seat.

Write to the Johnson Co., 515 Forest Ave., E., Detroit, Mich., for full particulars, mentioning the American Garage & Auto Dealer.

### The Dealer—The Law—The Lens.—And The Driver.

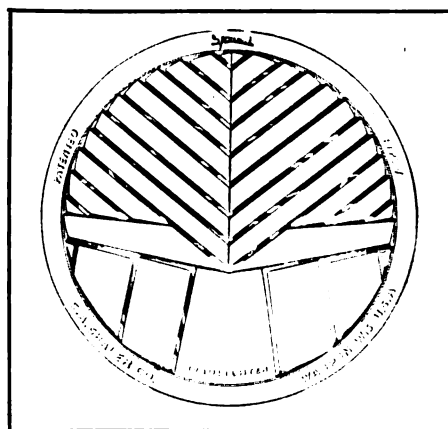
In the combination of the dealer, the law, the lens, and the driver, the dealer has had the worst of it up to the present time. There have been too few effective laws, and too many poor lenses. The driver has been conspicuous by his absence. Bad news travels fast and after a few drivers equipped their head-lamps with dimming lenses they found that they were spoiling their own driving light to make the road safe for the other fellow, at the expense of their own comfort and safety.

The ideal lens will show all of the road all of the time. It will show the sides of the road clear to the fence, and put such a bright light on the edge that the user can see just how far it is safe to turn out, in spite of the bright lights on other cars. That this result can be accomplished is demonstrated by the new type, V-Shaler Roadlighter, states the C. A. Shaler Co., manufacturer. This lens more than meets the requirements of the most rigid head-lamp laws.

The diagonal prisms on the upper part of the roadlighter bend the light, which would otherwise be wasted in glare, down and toward the edge of the road, and give enough spread to light the full width of the right of way near the car. The brightest part of the light falls on the edge of the road and gives the same effect as a spotlight directed along the edge of the road 30 or 40 feet ahead of the car.

The nearly vertical prisms on the lower part of the roadlighter are said to concentrate the light passing through them to about the width of the road at a distance of 150 or 200 feet ahead.

It is stated that more than 85,000 California cars were "Roadlighted" in 90 days



The Construction of the Roadlighter.

from the time the new law went into effect.

The C. A. Shaler Co., Waupun, Wis., will be glad to give further particulars concerning its product, to those writing it, and mentioning the American Garage & Auto Dealer.



How the Roadlighter Lights the Road.

quick-seating piston ring, manufactured by the Burd High Compression Ring Co.

This ring is of the step-joint type, the outer surface which comes in contact with the cylinder wall having raised edges which wear down quickly, seating perfectly with a glass-like surface in harmony with the

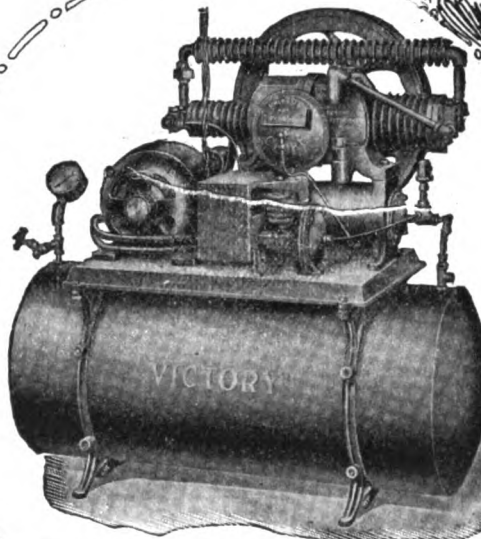


# Another great victory for Garagemen through **GLOBE** TWO-STAGE AIR COMPRESSORS

When pneumatic tires for trucks came into general use many garages and service stations were "up against it." Their air equipment was not capable of inflating the giant truck tires. They were obliged to see the trucks go elsewhere, not only for their "free air," but also for their gasoline, oil, parts and accessories.

But the garage with a **Globe Air Compressor** had nothing to worry over. These powerful two-stage compressors furnished ample pressure for inflating the heaviest truck tires. The garageman with the GLOBE not only held his truck patronage, but greatly increased it, as his air service drew trade from his less enterprising competitors.

*Is your air equipment equal to the present demands? If not, write today for Globe literature.*



"VICTORY" Complete Automatic Motor Drive Unit

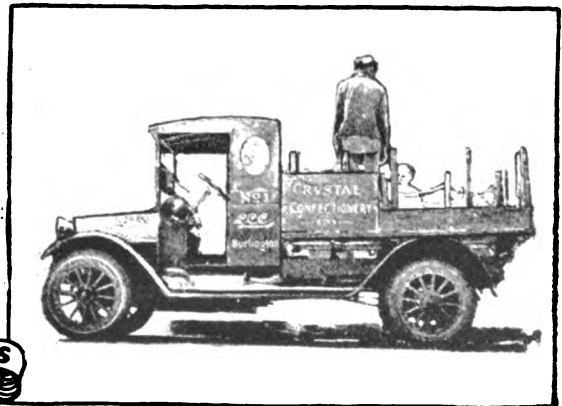


## GLOBE MANUFACTURING CO

Battle Creek Michigan



PNEUMATIC  
TIRED TRUCKS



# News of Manufacturers and Jobbers

## M. R. Davies Becomes Vice-President of Seelye & Brown.

Announcement is made that Maxton R. Davies, vice-president and secretary of the Dunlap Ward Advertising Co., Cleveland, and former manager of that agency's Detroit office, has returned to Detroit to become vice-president of Seelye & Brown,



M. R. Davies, New Vice-President of Seelye & Brown, Inc.

Inc. He will serve as counsel on automotive advertising and sales.

Mr. Davies is well known in the automobile and allied industries, having been prominently identified with the advertising of Chandler, Cleveland, and Grant motor cars.

## John B. Soper Appointed District Sales Manager for Acason Co.

Announcement has been made of the appointment of John B. Soper, of Philadelphia, as a district sales manager for the Acason Motor Truck Co.

Mr. Soper has held the position of general manager for the Acason Motor Sales Co. in Philadelphia where his remarkable work attracted the attention of the factory. He will now look after the sales' interests in eastern and south districts with headquarters in Philadelphia.

## Field Secretary of Motor & Accessory Manufacturers' Association.

Because of the rapidly expanding work of the Motor & Accessory Manufacturers' Association, it has been found necessary to appoint a field secretary to travel about the country and keep in direct personal touch with the various members.

M. L. Heminway, general manager of the

association, recently announced that Alexander W. Barber, formerly connected with the credit department of the Irving National Bank of New York City, has been selected for this important work. The new secretary has started on his western trip.

## V. V. Casey, Eastern Supervisor of Northwestern Chemical Co.

It is announced that V. V. Casey, who has been representing The Northwestern Chemical Co. of Marietta, Ohio, manufacturers of Norwesco "chemically correct utilities" in the southeastern states, was recently promoted to the position of eastern sales supervisor.

Mr. Casey is said to be an experienced salesman of automotive equipment and will now have charge of the entire eastern territory from Canada to the Gulf.

## Branch Managers of Bailey-Drake Co. Hold Sales Convention.

Ten branch managers of the Bailey-Drake Co. met at the home office, Chicago, recently to plan the sales work for the new year.

At the convention it was announced that national sales work had been assumed for some dozen important products, including Jackson pneumatic and electric drills, and pneumatic valve grinders, made by the Kalamazoo Railway & Supply Co., Kalamazoo, Mich.; Ibsco battery steamer, made by the Illinois Battery Steamer Co., at Peoria, Ill.; Klemme auto hoist and crane, made by the Klemme Mfg. Co. of Davenport, Ia., and Mentor auto horse, made by the Safety Equipment Co. of West Mentor, Ohio.

The Bailey-Drake Co. was established in

San Francisco in 1908, and its rapid growth made a central location of the head office imperative. Fred V. McGraw, president of the company, advised that the sales operations cover the entire United States and Canada, with offices maintained in New York City; Detroit, Mich.; Atlanta, Ga.; Dallas, Tex.; Kansas City, Mo.; St. Louis, Mo.; Minneapolis, Minn.; Seattle, Wash., and San Francisco, Cal., with headquarters in Chicago. In the very near future offices are to be opened in Philadelphia and Boston.

## Ford Foot Accelerator With Foot Rest Introduced.

About the first accessory that the average Ford owner thinks of purchasing is a foot accelerator, which is one of the handiest things that can be put on a Ford. This device, however, should be made right, so that the driver's foot will not tire after a long run.

In order to meet the demand for a foot accelerator of this character the Gemco Mfg. Co. is now manufacturing one which is equipped with a foot rest.

The accelerator itself is attached to the carburetor and can be operated independently of the hand control, and the hand control in turn can be operated independently of the foot control. With the Gemco accelerator, the maker claims that a Ford can be handled most efficiently in heavy traffic and that quick starting and perfect control are obtained.

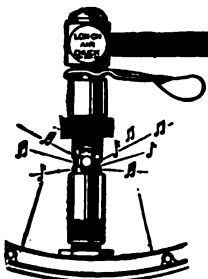
Send to the Gemco Mfg. Co., Milwaukee, Wis., for additional information and prices. In addition an interesting catalog which illustrates and fully describes a large number of popular and successful



Branch Managers of Bailey-Drake Co., Who Met in Chicago to Plan for Coming Year.

## LOX-ON

TRADE MARK  
AIR CHUCK  
DOESN'T RUB THE RUBBER



This view shows both the Lox-on and the Whistler in action.

## It Grips the Valve

**Y**OU know the usual type of air hose chuck—you have to *push* it down on the valve. In a short time, the rubber washer wears out—the chuck leaks and you've got to fix it—and then it does it again!

The Lox-on Air Chuck is positively *guaranteed* not to leak or wear out quickly. The rubber is not chewed to pieces by the valve threads. It slips over the stem freely—then, by turning the lever, you make it grip the valve like a hand. When ready to take off, reverse lever.

Simple, strong, everlasting and efficient, the Lox-on Air Chuck answers the crying need of garage men everywhere for a chuck that can be used indefinitely without wearing or leaking. \$3.00 each.



### Automatic Safety Tire Valve Corporation

1765 Broadway, New York  
Factory—Long Island City, New York

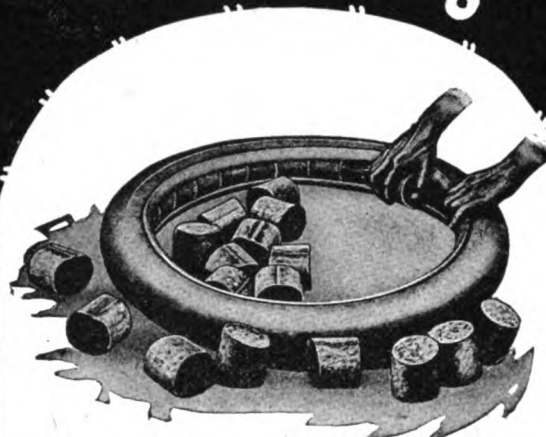
## Whistler

TRADE MARK  
IT WHISTLES WHEN IT'S HAD ENOUGH

Guards the tire against incorrect inflation. Set it for any pressure desired. It whistles when the right amount of air enters the tire. You can't put any more in. Saves 50% to 75% on tires; 20% gasoline; 100% time, trouble and temper. \$4.00 per set of 4.

## The TIRE FILLER

that has made good



## Trouble-proof tires with ample resiliency

is a combination that was long sought by the motoring public. Some tire fillers failed to stand up under long service—most of them lacked the essential resiliency. But these two vital qualities were at last combined in

## NATIONAL RUBBER TIRE FILLER

It has brought joy and satisfaction to tens of thousands of car and truck owners. It has done away with punctures, vulcanizing, patching, tire repairs of all kinds. Users get 10,000 to 20,000 miles out of every tire.

Besides, National Tire Filler has a wonderful resiliency. It takes the place of air, rides as easy, and does away with the inner tube.

National Rubber Filler is made of the best grade of rubber, cut in small particles, treated, moulded and vulcanized by our special process. The result is a compound that is light, strong and resilient. Made in sizes to fit all standard tires. It is laid in the tire and not melted or poured in. Will not harden, freeze, or melt—fully guaranteed against deterioration in any form.

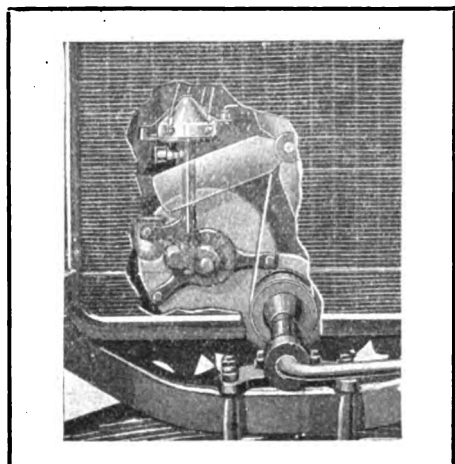
DEALERS—National Rubber Tire Filler sells because it has made good. It combines comfort with economy of tire upkeep. We have a fine proposition for you. Write us today.

**National Rubber Filler Co.**  
210 College St. Midlothian, Tex.

devices for the motorist will be sent to those who write to the company, mentioning the American Garage & Auto Dealer.

### Timer Elevator for Fords a New and Desirable Device.

The Thomas Andrews Corp. announces a new timer elevator which is guaranteed to eliminate ignition trouble because it raises the timer from its usual position at the end of the crank shaft, where oil working



New Timer Elevator for Fords.

out of the crank case often causes insulation and improper motor operation.

That the timer is raised by the device to an accessible position where it is protected from mud and water splashing through the radiator, that overhead wiring is made possible and an ignition system comparable to those employed on the highest-priced cars is provided, are additional features. The timer elevator is made to fit any Ford car or truck and can be installed in 20 minutes without special fittings or tools and without the removal of the radiator. Any timer made to fit a Ford is said to fit this timer elevator.

The sales department of the Thomas Andrews Corp., manufacturers of the product, is located at 624 South Michigan avenue, Chicago. Prices and additional information will be sent to those who write to them. And when you write, don't forget to mention the American Garage & Auto Dealer.

### Parts for All Makes of Cars, Trucks and Tractors.

The Parts Service Co., 5105 Euclid avenue, Cleveland, Ohio, has recently announced that it is in a position to supply any part for all makes of cars, trucks and tractors.

It carries a large stock of valves, spring bolts, king bolts, etc., manufactured to standard dimensions and of the proper quality.

All garagemen and repairmen who deal with the company know that its parts are quality parts, low in price and that its service is intelligent, prompt and a convenience.

### Clydesdale Distributors Move Into Larger Quarters.

The growth of Clydesdale business in Philadelphia has been so great that larger quarters have become necessary for the distributors, the Gawthrop & Wister Co., and this enterprising firm is now located at 14 South 21st St., where it has ample facilities and equipment for giving Clydesdale patrons the best of service.

The firm now occupies a commodious four-story building which has a frontage of 70 ft. and a depth of 108 ft. The salesrooms provide for a complete display of all of the models of Clydesdale trucks, from the one-tonner to the giant five-tonner, the largest of the line.

There is a complete parts department, with parts in stock for every Clydesdale truck, and a capable service department, equipped with the latest machinery for taking care of repair jobs and adjustments of every kind.

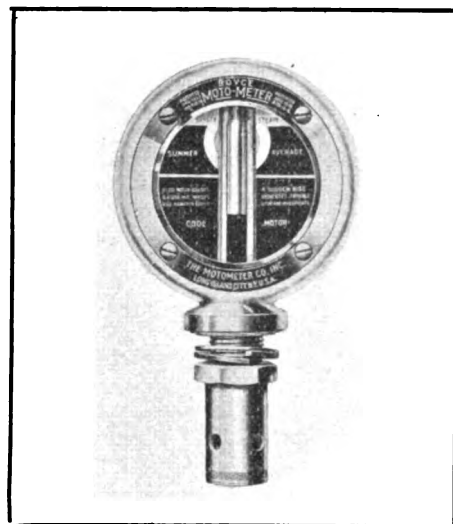
### New Boyce Moto-Meter Displayed at Automobile Shows.

At the recent automobile shows the Moto-Meter Co. displayed at its exhibit, a brand new Boyce Moto-Meter known as the de luxe model.

This model was designed for the highest grade passenger cars. The temperature tube is one-half inch in diameter, having a broad column of red liquid readable

at a great distance. The case is silver plated and the finish of the entire instrument is of the very highest quality and workmanship.

The Moto-Meter Co., Inc., Long Island



New Model Boyce Moto-Meter.

City, N. Y., will send more detailed information to those writing it, mentioning the American Garage & Auto Dealer.

### Trailer Manufacturers' Association Elects Officers for Year.

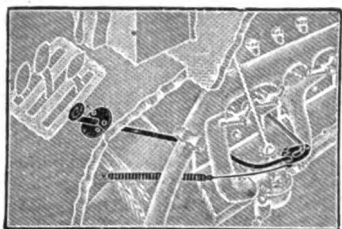
At the first annual meeting of the Trailer Mfrs. Association of America recently

The New Home of  
Gawthrop & Wister  
Co., Philadelphia,  
Distributors of the  
Clydesdale Truck.  
New Location Has  
Ample Facilities and  
Equipment for Giving  
Clydesdale Patrons  
the Best of Service.





# STOP RACING YOUR ENGINE



## *The* EWALD FOOT ACCELERATOR FOR FORD CARS

Does away with unnecessary racing of your engine and entirely eliminates those harmful hammering vibrations that come from running your motor at high speed without load. With an Ewald Foot Accelerator your motor slows down the instant that you take your foot off the accelerator to apply the brakes.

### LEAVES YOUR HANDS FREE

The Ewald Accelerator leaves your hands free to operate the wheel, brakes and horn which not only adds tremendously to the pleasure of driving but makes safety first more sure.

### A QUICK GETAWAY

With an Ewald Accelerator you can set the speed of your motor to a point where it is barely turning over and when the signal comes to go you can get away in a flash.

### SAVES GAS

By eliminating engine racing, the Ewald Foot Accelerator will save gallons and gallons of gas. It will pay for itself in a short time.

Guaranteed for the life of your car.  
Over 50,000 now in use.

**PRICE 75 CENTS**

*Write today for full details.*

**MANUFACTURERS**

**ROMORT MFG. CO., Oakfield, Wis.**

**SALES DEPT.**

**THE ZINKE COMPANY**

1323 Michigan Ave.

Chicago, Ill.

## Keep Business Humming



### ERECT A FEDERAL ELECTRIC SIGN

This handsome electric display will keep your name and location constantly fixed in the minds of customers who run their cars during the winter months. It tells them that you are ready to take care of any trouble that they might have, due to the winter weather. It also keeps your name and location before those customers who run their cars only in summer, so that when the tourist season comes around you will have their patronage.

This beautiful Federal Electric sign is made of porcelain enameled steel and will not rust, decay, fade or crack. Costs but a few cents a day for electricity—no other expense—an occasional washing keeps it bright and shining like new.

### You Have 12 Months to Pay

The first payment brings you the sign and you have the remaining 12 months to complete the payments. It will keep business humming for you.

Send the coupon today for full information—no obligation.

**(Mail This Coupon Today.)**

## Federal Electric Company

*Representing*  
**Federal Sign System (Electric)**  
**Lake and Desplaines Streets, Chicago**

Please send full information on Enameled Steel Sign for my business and your 12-months-to-pay plan. No obligation

NAME .....

ADDRESS .....

BUSINESS .....

(AG AD-2)

held in the association's headquarters in the Grand Central Palace, N. Y., J. H. Fertig was elected president to succeed W. E. Ferris, and C. H. Martin is to succeed C. A. Geiger. H. C. Fruehauf and J. C. Enderbrock were re-elected 1st vice-president and secretary-treasurer, respectively.

It was voted by the association to apply for membership in the United States Chamber of Commerce, and in the Federal Highway Council.

The desirability of standardizing the load rating of semi-trailers and pole trailers was agreed upon and the general manager was instructed to secure the views of all members as to the best method.

The May meeting of the association will be held in Detroit, and the September meeting probably in Cincinnati.

### New Branch Office Opened by Brunner Manufacturing Co.

A branch office in Kansas City, Mo., has been opened by the Brunner Mfg. Co., of Utica, N. Y., manufacturer of garage, air compressors. H. S. Atherton will have charge with the title of district manager. In opening the new office, the Brunner company is providing for more intimate contact with trade in the central territory west of the Mississippi.

A new descriptive catalog of the Brunner products, which include a complete line of belt and motor-driven air-compressors for every purpose, high-pressure air tanks and air fittings, and air equipment for garages, has been issued. Those who want a copy should write to the Brunner Mfg. Co., Utica, N. Y. It may be had for the asking. And—don't forget to mention the American Garage & Auto Dealer.

### Trade Medium of Stability Motors Co. Attractive and Interesting.

The first number of "Stability Service," the house organ of the Stability Motors Co., has just been received. Frank in its editorial policy, snappy in its news write-ups and rich in illustrations, it is sure to make a particular appeal to the trade. It represents the efforts of a dealer to become better acquainted with the people he serves.

If you wish the issue of "Stability Service" to be sent to you, send your name and address to the publicity manager of the Stability Motors Co., 1720-40 North Croskey St., Philadelphia.

### World-wide Distribution of Timers Due to Trade Paper Press.

The distribution of Red Star timers for Ford cars in all parts of the world is a tribute to the wide reach of the American automobile trade press, says the Auto Components, Inc., manufacturer of the product. Although the timers were ad-

vertised solely in these mediums, during the last 12 months they have been shipped in quantities to Europe, Asia, Africa, South America, and Australia.

"The Gold Coast Africa is a far-away place where the Red Star is being used. Hawaii is buying them by the gross, Paraguay has sent in with several orders, while England, France, and the other western countries of Europe are ordering in such quantities that a broad conception is given of the number of Fords that are running over there."

Not only are Europe, Asia and Africa represented on the list of purchasers, but



Red Star Timers Known World Over.

America, and that means, of course, the United States, has bought nearly 1,000,000 of the Red Star timers—a record for which the credit is given to the good quality of the product and the publicity gained through the trade paper press.

### Paragraphs.

THE BLACK & DECKER MFG. CO., Baltimore, Md., has further extended its permanent organization by the establishment of a branch office at 6523 Euclid Ave., Cleveland, Ohio. G. A. Dodge, formerly connected with the Austin Co. at its Cleveland headquarters, will be in charge of the new Cleveland branch.

THE HUDSON MOTOR SPECIALTIES CO., Philadelphia, Pa., announces the appointment of James J. Jennings as assistant to the vice-president.

### BOOK REVIEW.

INFORMATION: ELEMENTARY ELECTRICITY, MOTOR CAR ELECTRIC SYSTEMS, THE GAS ENGINE FROM AN IGNITION POINT OF VIEW, DRIVING THE CAR, by Harvey E. Phillips, 492 pages, 5¾ ins. by 9 ins., 500 diagrams and illustrations; published by H. E. Phillips Co., Dayton, Ohio. Price \$2.50.

This volume presents, in a compact, convenient form, a reasonably comprehensive and thorough training course in elementary electricity as applied to the automobile en-

gine, for mechanics, repairmen and car owners.

The book is divided into sixteen sections. In the first section, the subject of elementary electricity is thoroughly explained. In the second section, detailed instructions on driving the car and taking care of the car are given. The third section deals with the gas engine from an ignition point of view. Sections four and five cover the Delco systems from 1910 to 1916. Section six explains the various automobile electric systems now in use in various automobiles. Section seven explains the various magneto systems in use on automobiles. Section eight is devoted to electric testing, and sections nine to sixteen contain the wiring diagrams of the various electric systems as installed on the automobiles in use at the present time.

All instructions on how to make repairs and adjustments are well illustrated and about 200 wiring diagrams are included. The book is a veritable encyclopedia for those who are interested in the electric systems in use on the automobiles of today. To all mechanics and repairmen the book should prove of practical value.

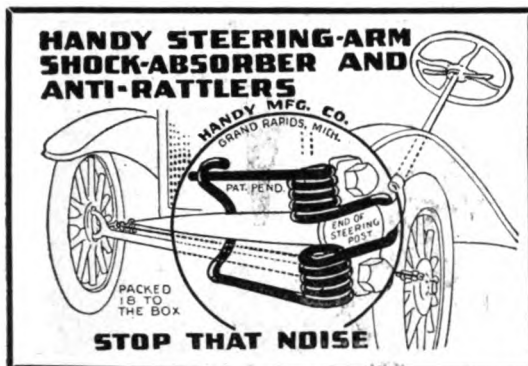
COMPLETE PRACTICAL MACHINIST, EMBRACING LATHE WORK, VISE AND BENCH WORK, DRILLS AND DRILLING, TAPS AND DIES, HARDENING AND TEMPERING, MAKING AND USE OF TOOLS, TOOL GRINDING, MARKING OUT WORK, LATHE ATTACHMENTS AND THEIR USES, MACHINE TOOLS, ETC., by Joshua Rose, M. E. 547 pages, 5¾ ins. by 7¾ ins., 432 illustrations; published by Henry Carey Baird & Co., Inc., New York. Price \$3.

This work, now in its 20th edition, is one of the well-known books on machine shop work and is written for the practical workman in the language of the workshop. It gives full practical instructions on the use of all kinds of metal-working tools, both hand and machine, and tells clearly and precisely how the work should be properly done.

The first chapters are devoted to an explanation of cutting tools for lathe and planing machines, cutting speed and feed, boring tools for lathe work, screw cutting tools, lathe dogs, carriers and drivers. Following this, chapters are devoted to methods of doing various kinds of jobs on the lathe. There are also chapters on tool steel, the use of tools, marking out work, lathe attachments and their uses, and miscellaneous information of general interest to a mechanic.

All of the explanations are given in detail in the familiar work-shop language, and are well illustrated to make them clear.

The earnest mechanic or machinist seeking greater efficiency will undoubtedly be helped toward using both his hands and his head to better advantage, if he employs this volume as a book of reference and instruction.



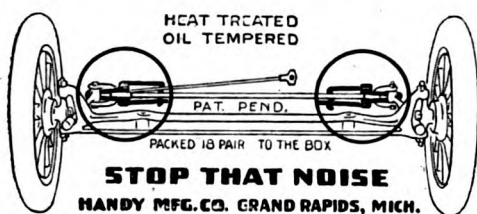
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 FITS 98% OF CARS



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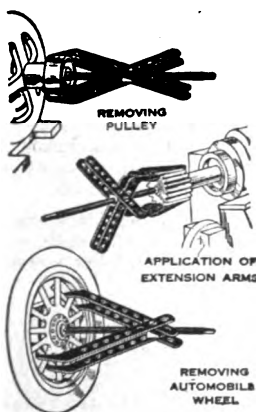
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Equipping a truck with  
 Foley Rims makes it  
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Foley Traction Rims  
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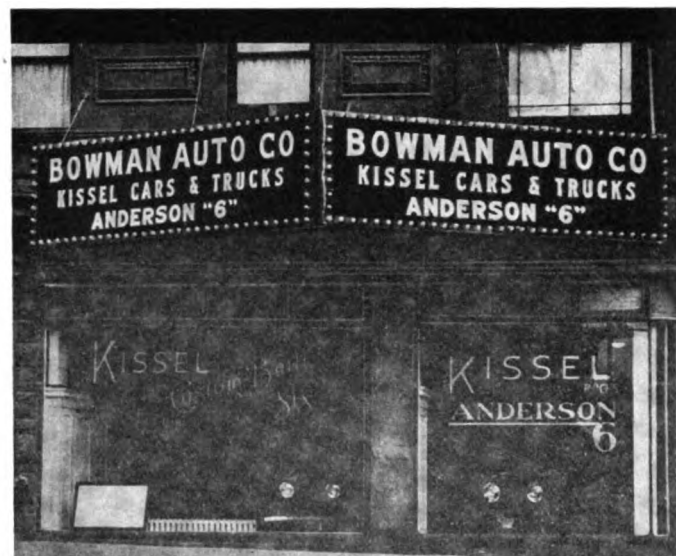


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 GEAR AND WHEEL PULLER**

Pulls any gear, wheel or pulley any-  
 where in a jiffy. Built on the only cor-  
 rect principle. Produces maximum ef-  
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 THE PULL—THE TIGHTER THE  
 GRIP.** Reduces operating cost and in-  
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 Adjustable up to 13 inches diameter.  
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**A**UTOMOBILE sales agencies have  
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raised, snow-white glass letters, on a dark  
 background—a most striking day-time  
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 stands out, a solid, clear-cut letter of  
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An Oplex Sign will put not only your  
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 on the street.

Won't you let us send you a sketch  
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**The Flexlume Sign Co.** Electrical Advertising  
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Canadian Distributors  
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## YOU CAN DO THIS WORK

The Universal Main Bearing Babbitting and Boring Equipment for Ford and Fordson Motors is highly endorsed by 14 out of the 16 Ford dealers in the city of Detroit—"The Home of the FORD."

This is a recommendation of which we are proud.

Garage-Men! Let us help you to build a bigger and better business.

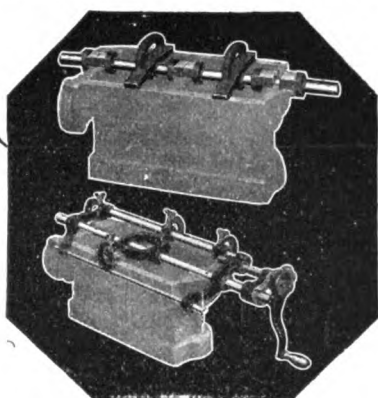
*Write for nearest jobber.*

**The UNIVERSAL TOOL CO., Inc.**

*Makers of UTCO Products*

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## GANSCHOW GEARS

**for service and reliability**

The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

Write today and feel free to consult our Engineering Department.

**Wm. Ganschow Company**

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## Jackson Rotary Compressors

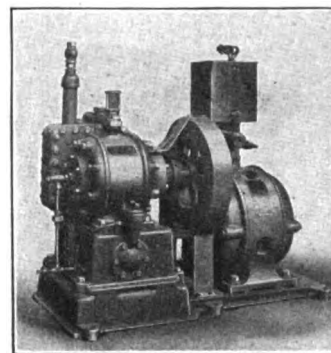
Weigh less than half of other types but will satisfy the most exacting. **Note these features and write for full particulars.**

Slow Speed, No Vibration, Positive Displacement, Easy to Install, Simple to Operate, Perfect Balance, Quiet in Operation. Especially adapted to garage purposes.

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COMPRESSOR  
COMPANY**



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Colorado  
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**will pay \$100**

if they fail to duplicate any part of any make of automobile or truck foreign or domestic, submitted to them. That sum will be paid to the person sending the order.

Parts of any machine can be duplicated in 1 to 3 days' notice. All welding is done at their risk. Do not compare this work or welding with that of others. If you have a broken part or parts that others cannot weld or repair, send them to Pondelick's. They increase the durability of many parts—even where the manufacturers fail.



Supply your customers with "Pondelick's" anti-leak piston rings, and you insure them against engine trouble.

They have the largest and best equipped plants in the United States for the repair or reproduction of automobile parts.

Cylinder regrinding, new piston, special casting, heat treated, Pondelick's self-adjusting, anti-leak piston rings, new wrist pin, hardened and ground, bushing made of genuine bronze, including fitting and assembling of connecting rod to piston for \$15.00.

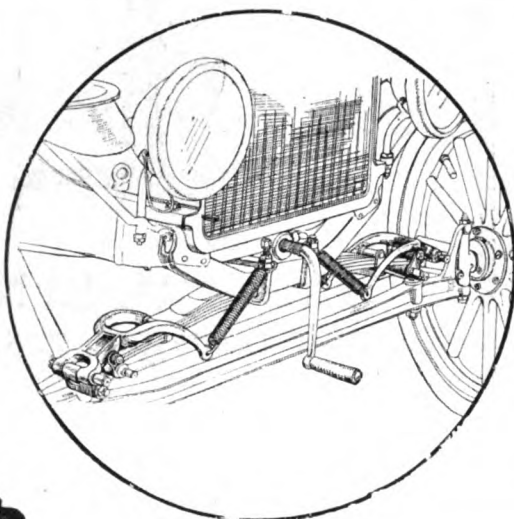
Reputation, not competition, determines our policies. Visit our plants and be convinced. Ask anywhere or anybody about our work.

General Factory, 5100 to 5112 West 16th St.  
Main Office, Leavitt St. and Jackson Blvd.

**Pondelick Brothers, CHICAGO ILLINOIS**



# What has "1920" in store for you?



ARE you going to be satisfied with equalling the accessory business of the previous year, or are you out for a big increase? If you are in the latter class we would like to talk business with you.

Probably no other accessory on the market affords such an all year 'round selling opportunity as shock absorbers for Fords. Among these the W & C's stand alone in both efficiency and popularity.

W & C's are the only shock absorber with bronze bushings—a feature that every Ford owner will appreciate. They sell best because they have actually done what other shock absorbers claimed to do—put comfort into the Ford.

Retail Price still \$10.00 per set of four. Liberal dealers' profits. Write for particulars.

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Chicago Sales Office:  
WALTER ECKHOUSE  
& CO.  
616 S. Michigan Ave.



**More than 200,000 W & C  
Shock Absorbers are in service**

## You get a good share of the profit.

The **MODEL "N" MARVEL CARBURETER** improves car performance, and increases mileage from 22 to 25 miles per gallon.

No changes are necessary to install it. Fits right in place of regular installation.

## MARVEL CARBURETER

*Designed especially for FORDS*

sold on 30 days' trial, with money back if not satisfactory.

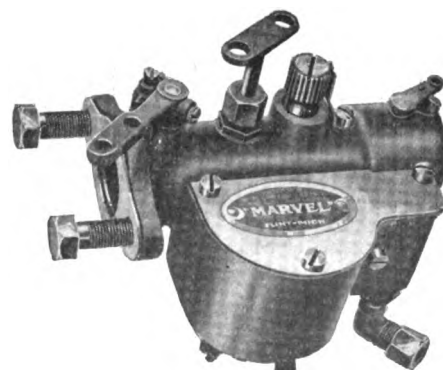
Price F. O. B. Factory \$10.00

**MODEL "E" CARBURETERS** are standard on Buick, Oakland, Nash, Scripps Booth, GMC, Wilson and all  $\frac{3}{4}$ -ton U. S. A. Government Trucks.

**MODEL "E" Carbureters** greatly improve Maxwell, Overland, and Studebaker cars.

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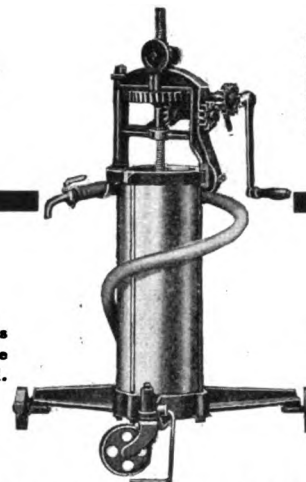
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Kindly hurry that order for Inflating Valves. We had no trouble with our Free Air Station as long as we used this Valve but when we had to put in another make,—the fun began.

EXTRACT FROM ACTUAL LETTER RECEIVED.

**POURS  
OUT  
STEADY  
PROFITS**

**ENTIRELY  
HAND  
OPERATED**



Model K holds  
20 lbs. grease  
or 2½ gals. oil.

Model N holds  
56 lbs. grease  
or 7 gals. oil.

## Ekern "Model N" Portable Garage Grease Gun

Undoubtedly there is scarcely any garage equipment which is absolutely indispensable; yet there are a few products which come mighty close to being necessary. Among these, our "MODEL K" and "MODEL N" PORTABLE GARAGE GREASE GUNS are very prominent.

Address us today for full particulars

*H. G. Paro Co.*

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## ZELNICKER Ever-Tyte The Piston Ring for All Engines

More power with less gas and oil guaranteed

Write for interesting details

**THE EVER TIGHT PISTON RING CO.  
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Write today for the facts

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*The only perfected tire remiler*

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Dept. A231 AKRON, OHIO  
Makers also of Miller Uniform Geared-to-the Road Tires and Red and Gray Inner Tubes—Team-Mates of Uniform Tires.

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OUR LOCATION HAS ENABLED US TO BECOME  
QUICK SHIPPERS

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ESTABLISHED 61 YEARS

**BECK & CORBITT**  
AUTOMOTIVE EQUIPMENT

1222 to 1244 North Main Street ST. LOUIS, U. S. A.

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Waiting for lower prices before ordering that equipment you need or stocking these accessories your customers want is like sitting on a fence and waiting for your rich uncle to die. You lose more than you can possibly gain by a drop in prices.

To make 1920 your best year buy your requirements NOW.

**AMERICAN GARAGE  
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Auto owners and tire dealers who sell old tires for junk prices are picking their own pockets.

There's money in those old tires, even if they are sand-blistered, punctured, rim cut, or blown out.

**Send them to us.**

We remake them by a process that gives them at least 5000 more miles of service. There is a good market in every locality for these tires, and you can sell them at a good profit.

Write today for our proposition, and start saving those old tires.

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Qualify right away for a **good paying job** and bright future in the Auto and Tractor field. At our great school, under expert instruction, you can learn to operate, adjust and repair all makes of Autos, Tractors, Trucks and Gas Engines, including complete automotive electricity. Low tuition now. Work with actual tools.



Write at once for particulars.

**Free** A fine kit of 29 tools given to everyone who enrolls now.

Send for free book. Get full information.

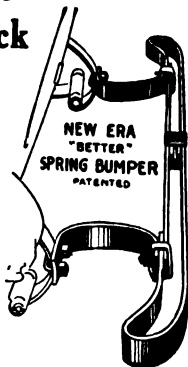
**MILWAUKEE MOTOR SCHOOL**  
Dept. 832 555 Downer Ave., Milwaukee, Wis.

One of the Great Big Profitable Reasons for Selling New Era "Better" Bumpers is this—

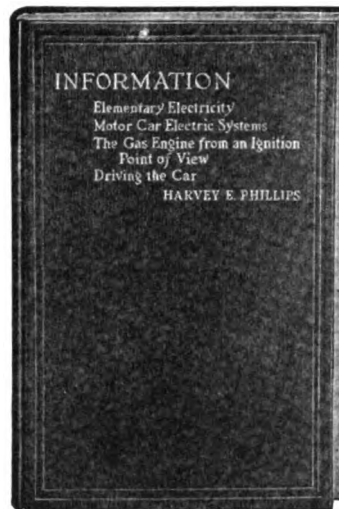
## There Is No Dead Bumper Stock

Why? Because the attaching arms are exchangeable at our factory at any time. That is one of the reasons why so many dealers sell them. Another reason—there is a fitting of spring steel arms for every car—front and rear—to meet every demand.

**New Era Spring & Specialty Co.**  
1152 Hamilton Ave. GRAND RAPIDS, MICH.



## This Practical Book will solve many of your problems



This is our new book on elementary electricity, motor car electric systems, the gas engine and driving the car.

It is complete in detail and will prove to be a practical help to any garageman or repairman.

Used and recommended by all manufacturers.

**Price, prepaid, \$2.50**

Cloth Bound, 6" x 9", 500 Pages.

Order a copy today or write for full information.

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(Formerly Phillips Engineering Co. and Auto Electric Systems Publishing Co., Dayton, Ohio)

## You Don't Guess the Answer You READ It on the Blade

Cylinder measurements guaranteed accurate to within .00025" and less.



## The AM-PÉ-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and **instantly** read the correct measurement.

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**PRICE \$2.50**

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MARSHALLTOWN, IOWA

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Built to Underwriters' Specifications

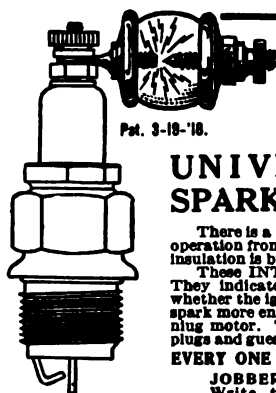
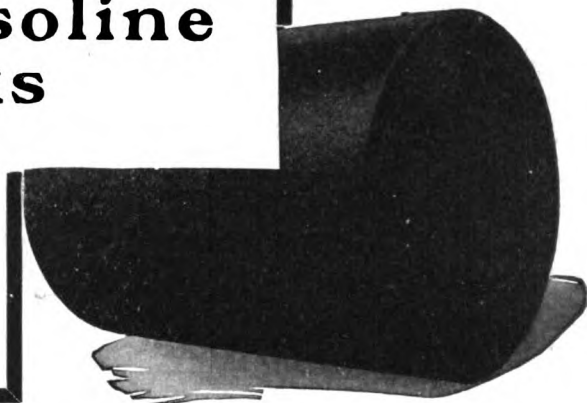
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Write for quotations to

**DINES & FOUTCH**

301-302 Unity Building

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on the car equipped with

### UNIVERSAL or MARVEL SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon. These INTENSIFIERS will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM

JOBBER and DEALERS—Your profit is liberal.

Write today for our attractive proposition.

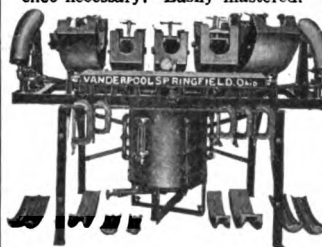
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Open a **Tire Repairing Shop!** Make big money! No experience necessary. Easily mastered. Tire repairing has no dull season. Extreme cold weather has detrimental effect on tires—they need more careful attention and frequent repairing.



### VANDERPOOL VULCANIZER

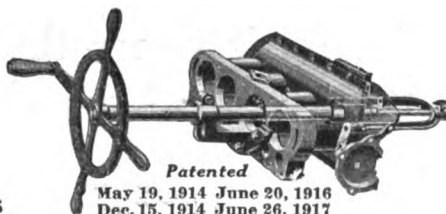
(5 Cavity) has capacity of \$100 worth of work a day. We supply complete outfit. Send for **FREE TIRE REPAIRING MANUAL** and full particulars. Write or wire immediately.

**Wm. Vanderpool Co., Springfield, Ohio**

In answering address Dept. A-1.

## REPAIRMEN — LISTEN!

The Heiser Improved Cylinder Reboring Tool for Ford Motors



Patented

May 19, 1914 June 20, 1916

Dec. 15, 1914 June 26, 1917

is the only Reboring Tool in the world that is self sharpening. It is the only Tool except expensive grinders that will not leave the finished cylinder slightly tapered toward the bottom. It is the only Tool that rebore between centers—this insures a finished cylinder, square with the crankshaft, round, straight and true. It is adjustable, and the only Tool that will rebore different sizes without losing the adjustment.

The best mechanic in the world can't build reputation without proper TOOLS and EQUIPMENT. The HEISER IMPROVED CYLINDER REBORING TOOL makes good shops out of poor ones and better shops out of good ones.

Write today for full particulars.

Heiser Special Tool Co., 2001-21 Washington St., Kansas City, Mo.

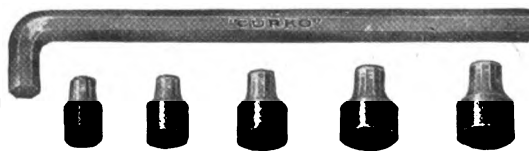
## GRAHAM SOCKET WRENCHES

Are turned from the best Solid Bar Stock and are Heat Treated. For

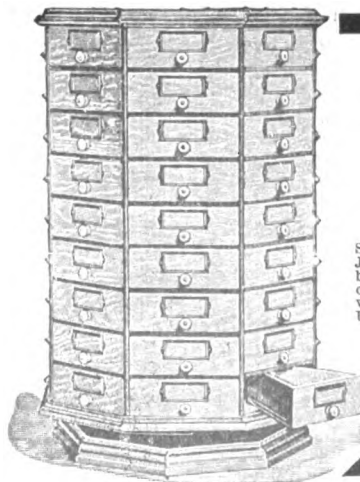
### STRENGTH and RELIABILITY

They are unexcelled. Ask for dealer's discount.

Price  
**\$1.75**



**Graham Roller Bearing Co., Coudersport, Pa.**



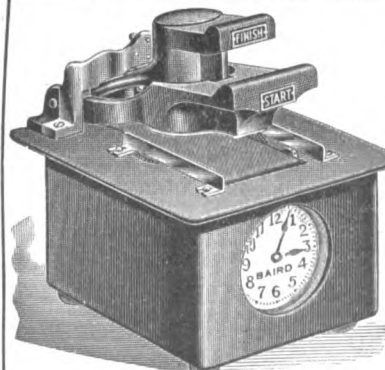
Keep your supplies in revolving cabinets like these

Systematic! Conveniently Accessible! Just like "rolling off a log" to look up bolts, screws, etc., with this revolving cabinet. Everything at your finger tips, with nothing to burden your memory. Used by leading garages of this country.

Buy today from your jobber. Catalogue on request.

**American Bolt & Screw Case Co.**  
DAYTON, OHIO

Put your repair charges on a profitable basis with



## BAIRD TIMING DEVICES

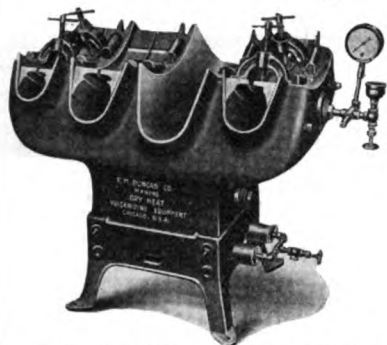
Keep a check on your employees' time and learn exactly what each job costs. Automatic supervision turns losses into profits.

Prices moderate. Write today for booklet.

**Baird Equipment Co.**  
324 W. Ohio St., Chicago  
Phone Superior 2071



## Duncan Equipment Marks a New Era in Vulcanizing



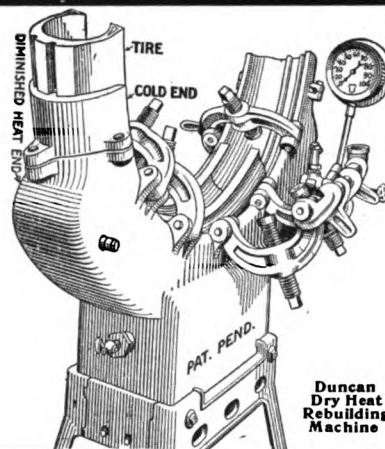
Duncan Adjustable Cavity Sectional Mould

The Duncan Dry Heat Rebuilding Machine will rebuild a tire with sides and laps perfect in construction and finish—comparable with the single cure factory mould.

The Duncan Adjustable Cavity Sectional Mould with its cavity sides and side plate construction affords a correct cavity shape and size for each tire cured—this feature is not found in any other mould.

*Only good vulcanizing pays. If you want to control this business in your locality, investigate Duncan Equipment. Particulars on request.*

F.M. DUNCAN Co., 114-116 E. Ohio St., Chicago, Ill.



Duncan Dry Heat Rebuilding Machine



## Wrecked!

When you get that call, be prepared to go to the rescue with a

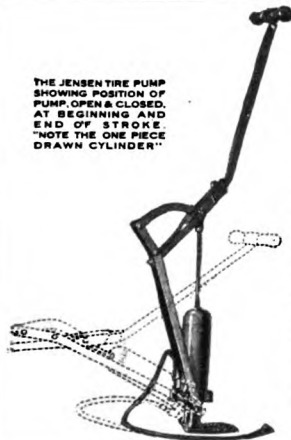
### Holmes Wrecking Truck

You can get the crippled car to your shop quickly and easily. The time and labor saved soon pays for it. Made of the best materials with ample strength for any job.



Write for full information and price

**Robt. Holmes & Bros.**  
Danville, Illinois



THE JENSEN TIRE PUMP  
SHOWING POSITION OF  
PUMP, OPEN & CLOSED,  
AT BEGINNING AND  
END OF STROKE  
NOTE THE ONE PIECE  
DRAWN CYLINDER

Tell your customers  
not to break their  
backs pumping tires

**\$6.00**

### Jensen Tire Pump

Will produce 90 pounds pressure more easily than you can pump 65 pounds with the ordinary vertical pump, with one-quarter the effort and in half the time. Well made throughout.

Discounts on request

**The W. H. Howell Company**  
Geneva, Illinois

The

**NU-WAY  
PATCH**

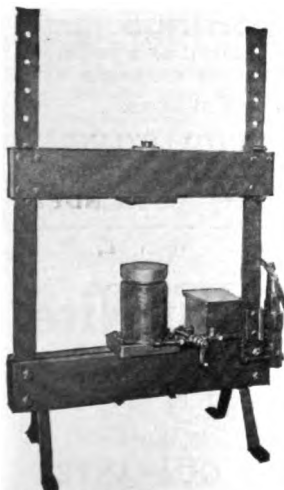
for

## Inner Tubes

A tight, permanent patch applied in two minutes. Tube may be used immediately—no waiting for patch to set.

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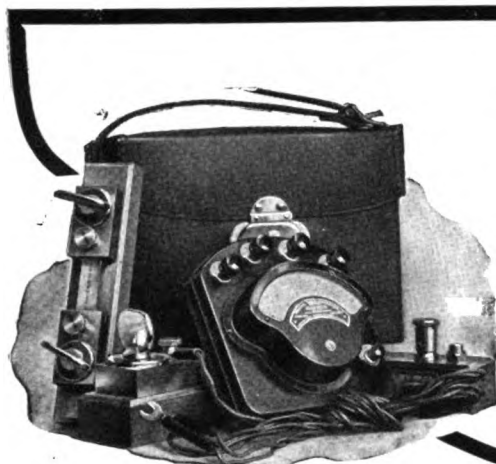
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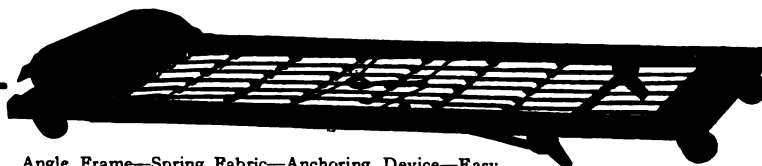
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New England Mills Co., 1027 W. Van Buren St., Chicago.  
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Brunner Mfg. Co., Utica, N. Y.  
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General Utility Co., 1338 Ogden St., Philadelphia, Pa.  
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Marvel Machinery Co., Minneapolis, Minn.  
St. Paul Auto Cylinder Grinding Co., 1152 Rice St., St. Paul, Minn.  
Storm Mfg. Co., Thompson, Iowa  
Universal Tool Co., 435 Woodward Ave., Detroit.

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Am-pé-co Sales Co., Marshalltown, Iowa.

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Weston Electrical Instrument Company, Newark, N. J.

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F. M. Duncan Co., 114-116 E. Ohio St., Chicago.  
Haywood Tire & Equipment Co., 650 No. Capitol Ave., Indianapolis, Ind.  
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Zinke Co., 1323 So. Michigan Ave., Chicago.

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Stenman Electric Valve Grinder Co., 41 Southbridge Ave., Worcester, Mass.

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Vanderpool Vulcanizing Co., Springfield, Ohio.

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Robt. Holmes & Bro., Danville, Ill.

## WRENCHES

Au-to Compressor Co., Wilmington, Ohio.  
The Graham Roller Bearing Co., Coudersport, Pa.  
Sawyer Sales Co., 50 Terminal Bldg., Lincoln, Neb.



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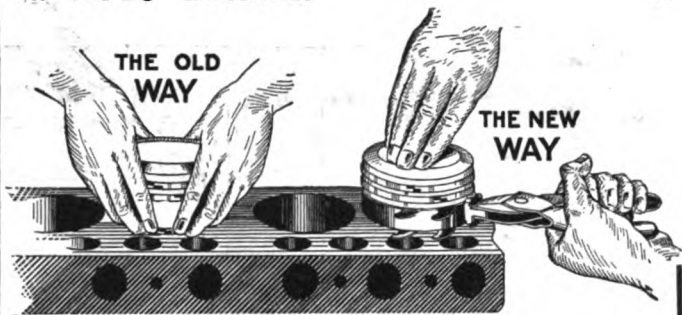
## KENNEDY Auto Storage Covers

furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

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THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind.

**AUTOMOBILE SPRINGS**  
MANUFACTURERS AND SPRING SERVICE  
**GARDEN CITY SPRING WORKS**  
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*Fills a Long Felt Want in Every Garage*

**Saves Times—  
Saves Rings**

Inserts pistons into either top or bottom of cylinder in ten seconds without danger of ring breakage. Instantaneously adjustable to all size rings from 2½ inches to 9 inches. Used on any type motor.

Should be in every mechanic's tool kit.

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*This tool is sold by all Accessory Jobbers.*

Place your order now.

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GRAND RAPIDS, MICHIGAN

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**34 TYPES TO  
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**LABELED BY THE  
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LABORATORIES**

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**UNDERGROUND  
"KANT-LEEK"  
TANKS · 60 TO  
12000 GALLONS**

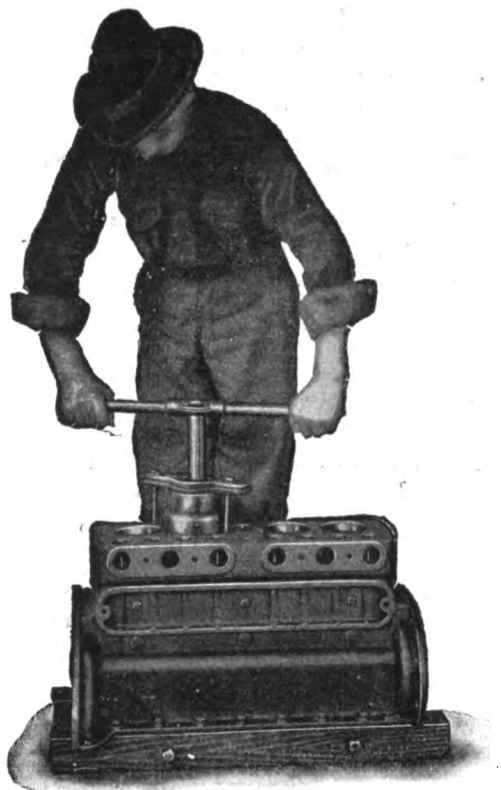
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**SPECIAL  
PROPOSITIONS  
TO JOBBERS**

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**WRITE TO DAY  
FOR CATALOG "9"**

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TANK WORKS  
MILWAUKEE, U.S.A**

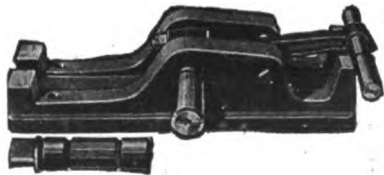
# STORM

## MOTOR REPAIR EQUIPMENT

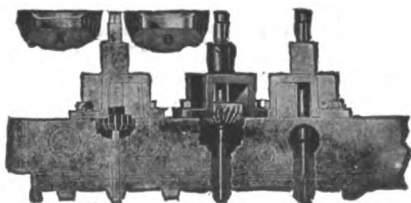


Storm Standard Reboring Machines have been tested, approved and are being recommended by all leading jobbers and manufacturers throughout the world. *Made by practical men for practical purposes.*

The Storm Connecting Rod Bearing Reamer, Jig and Straightening Gauge accurately and quickly fits and cleans connecting rod bearings—tests and straightens the rod.



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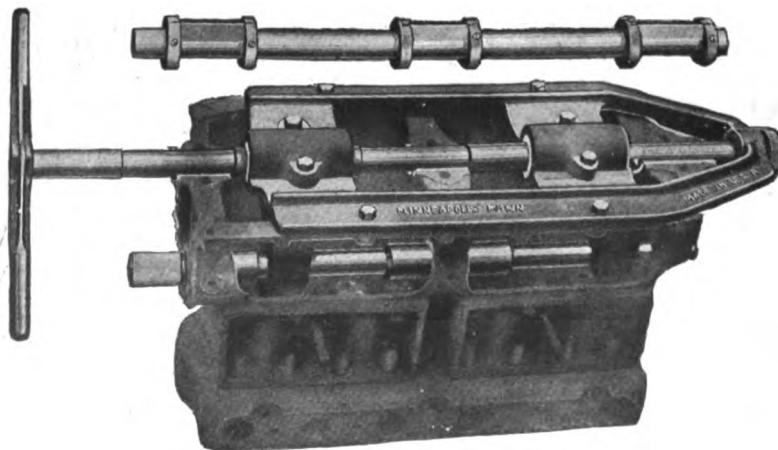
Storm Equipment is standard and is built for hand or power operation. No matter how small your garage is—or how large—we can supply you with Storm Tools that will increase your output and your profits.

Ask for our catalog and full details. It will pay you to look over our line.

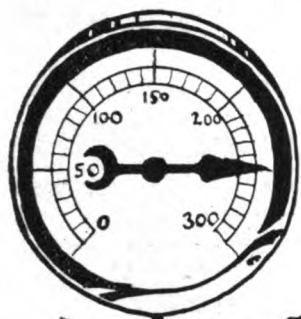
**Storm Manufacturing Co.**

Dept. E

Minneapolis, Minn.



Storm Main Bearing Babbitting and Boring Tools should be used by every shop doing Ford and Fordson work. For making new, perfect main bearings in proper position and perfect alignment. *Speedy and accurate.*



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The big truck tires that are daily becoming more numerous on our highways, have inaugurated a new standard of air compressor service. Garages and service stations must be equipped to furnish air at from 150-250 pounds pressure.

## CHAMPION AIR COMPRESSORS

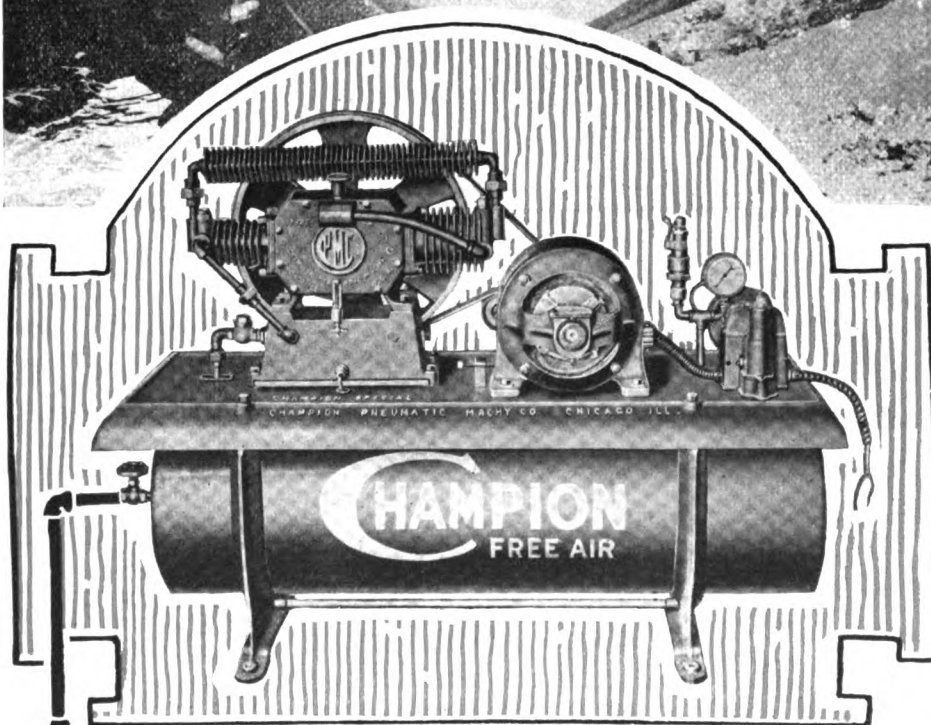
are made to fully meet these new requirements of air service. The tank furnished with the Champion Special Automatic Air Unit is tested for 250 lbs. working pressure, assuring ample power for inflating the largest truck tires.

Champion Air Compressors are ready for prompt delivery. Write today for full information and prices.



**Champion Pneumatic  
Machinery Co.**

1402 South Michigan Avenue  
CHICAGO







**"Yes! NOKORODE is the best flux you can use for your soldering!"**

Hundreds of dealers throughout the United States take just pride in selling NOKORODE to their customers.

When an inquiry is made as to the best soldering flux to use, the ready answer of the dealer is—"NOKORODE."

Dealers have found that it pays to handle NOKORODE which

is one of their best "repeat" sellers.

NOKORODE has been used in thousands and thousands of different soldering jobs and never once has failed to prove its dependability.

NOKORODE eliminates bother and makes soldering a real pleasure.



Because NOKORODE is the universally used soldering flux, it is the "money making" flux for you to sell.

Our sales proposition is one of the most interesting that has ever been offered to dealers—write for particulars immediately.

**THE M. W. DUNTON COMPANY**  
PROVIDENCE, R. I., U. S. A.



# American Garage & Auto Dealer

Published Monthly  
116 So. Michigan Ave.  
CHICAGO, ILL.

MARCH 1920

Vol. 11—No. 3  
10 Cents the Copy  
\$1.00 Per Year.



**Millions Have Bought It**  
**—millions more need it!**

Millions of SHALER 5-Minute Vulcanizers have been sold to motorists. Millions of other motorists are being induced, through our large advertising campaign, to want the SHALER 5-Minute Vulcanizer.

*The dealers who sell it make the profits.*

Dealers predict larger sales of SHALER 5-Minute Vulcanizers for the future than during the past. Larger repeat sales—and profits for dealers—must follow.

Every sale of a SHALER 5-Minute Vulcanizer is *not* one sale and one profit alone—it means that more sales will follow from the same customer, because he needs to buy the Patch-and-Heat Units regularly for use with the SHALER.

This repeat business comes to you—and brings you regular profits—in addition to your profits from selling the SHALER Vulcanizer—and without any effort on your part.

**Get Your Share of This Big Business—Order from Your Jobber Today!**

Keep a good stock of SHALER 5-Minute Vulcanizers and SHALER Patch-and-Heat Units. Display them prominently in your windows and on your counters, so that motorists know you sell them. Our advertising will bring customers to your store—the SHALER sells itself. Order from your jobber today or write us at once for full information and catalog of the complete SHALER Line.

**C. A. SHALER CO.      352 Fourth Street      Waupun, Wis., U. S. A.**

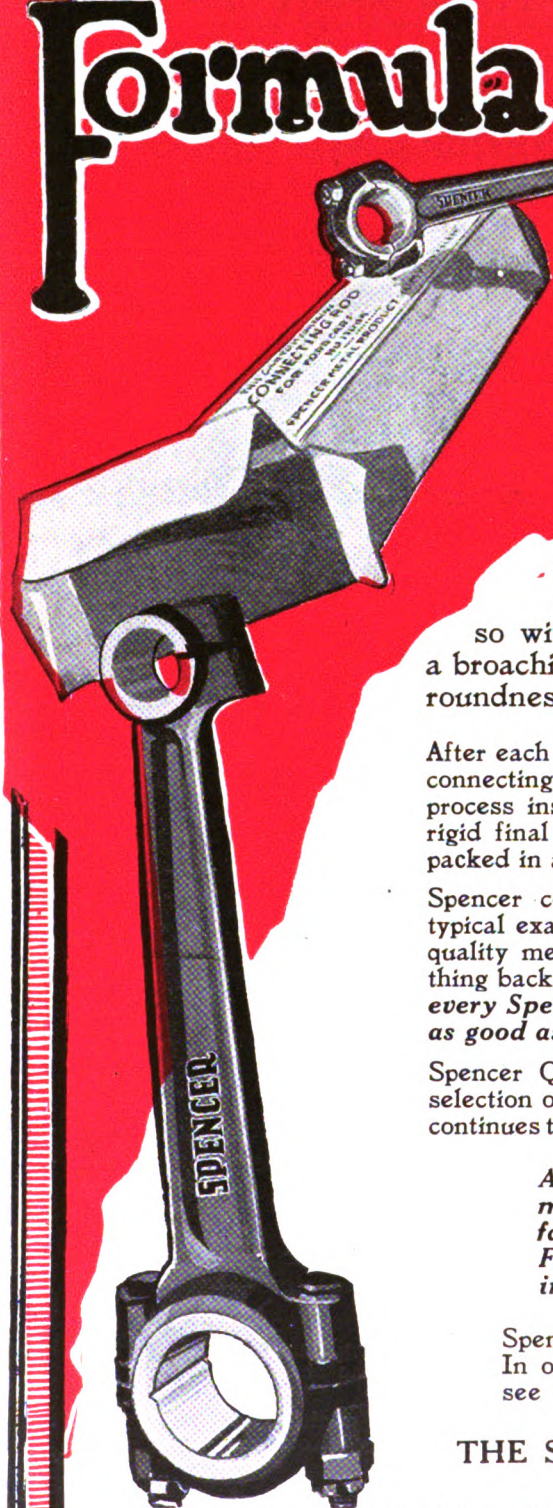
*• Oldest and Largest Manufacturers of Vulcanizers in the World.*

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# Babbitt's Original Formula

## 90% Tin



**M**OST manufacturers apply babbitt to the connecting rod and call the job done. Not so with a Spencer connecting rod. It is then put into a broaching machine; accurately worked down to perfect roundness; less than 1000th of an inch tolerance is allowed.

After each operation the Spencer connecting rod is subjected to process inspection, as well as a rigid final inspection. It is then packed in an individual carton.

Spencer connecting rods are a typical example of what Spencer quality means. There is something back of our guarantee that *every Spencer part is at least as good as the one it replaces.*

Spencer Quality starts with the selection of the raw material and continues throughout the different

processes of manufacture, inspection, packing and shipping. We make certain that the goods reach the user *right.*

Spencer also means good delivery service. We operate on a large scale; buy raw materials in vast quantities; have a factory equipped with modern machinery; carry large stocks; are ready at all times to take care of quantity orders.

You can get Spencer quality, protection and service in the following items:

*Axle shafts and drive shafts for all popular makes of cars. Connecting rods, radius rods, fans, mufflers and steering wheels for Fords. Gilliam take-down taper roller bearings for light cars and commercial trucks.*

Spencer Guaranteed Products are sold only by the jobber. In ordering replacement parts from yours, specify and see that you get SPENCER GUARANTEED Products.

THE SPENCER METAL PRODUCTS COMPANY

Factory: Spencer, Ohio

624 S. Michigan Ave., Chicago

16 to 24 W. 61st St., New York

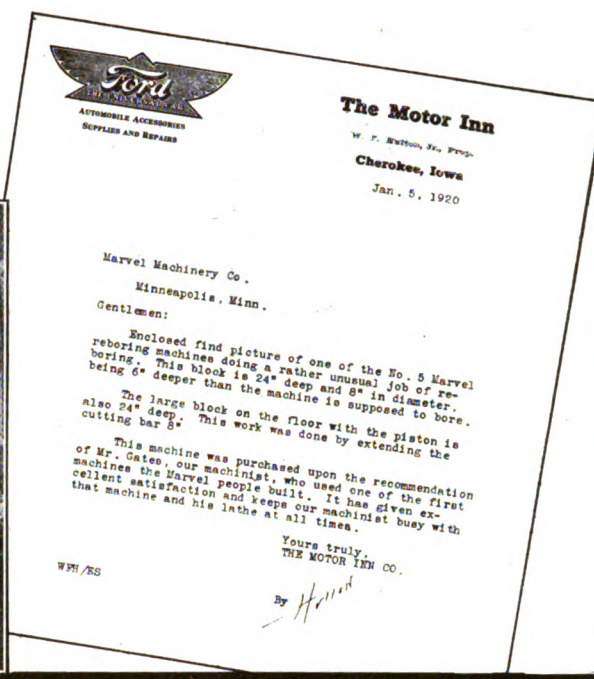
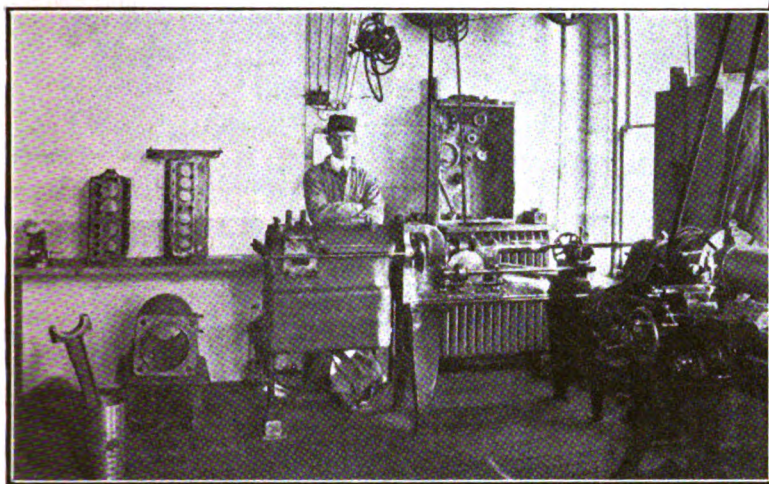
*Spencer Quality*

*Costs You No More*





# PROOF



That's the kind of letters we get from all users of the

## Marvel Cylinder Re-Boring Machines

It's a statement right from the heart—an expression of appreciation for work well done. It's the kind of talk we want every subscriber and reader of the *American Garage and Auto Dealer* to get—we want them to read it—and THINK.

Read Mr. Hutton's letter again and then if you want more proof—more evidence regarding the practicability—the real value and the business-building qualities of the MARVEL No. 5—write us—we will send you letters from all sections—from big cities and little towns—we will prove to your entire satisfaction that for re-boring engine cylinders the

## MARVEL CYLINDER RE-BORING MACHINE IS SUPREME

There is no other machine like the MARVEL No. 5—it is in a class by itself. Installed in your shop it will double your man-power and turn wasted hours into profit. It is power-driven—automatic—accurate and speedy. The MARVEL has been endorsed by hundreds of schools—colleges and automotive repairmen.

### USE THIS:

Our interest does not stop when we get your order—it only begins. We furnish you the most complete campaign of co-operative business bringing advertising ever prepared for a similar machine. Everything from introductory letters to newspaper ads—from movie slides to fence signs. This advertising will bring business to you.

### STOP THIS:

Good money—liberal—substantial profits are going to pass your door every day and they will continue to go until you equip your shop to restore full compression to the automobile—tractor and all gas engines by re-boring their cylinders and fitting with oversize pistons. Quick—satisfactory—profitable service may be had with a MARVEL No. 5 and MARCO OVERSIZE PISTONS.

**Don't delay. Look into this today.**  
**Write—we will respond promptly and fully.**

## MARVEL MACHINERY COMPANY

510 Loan and Trust Building

MINNEAPOLIS, MINN.



# "NORMA" PRECISION BALL BEARINGS

(PATENTED)

Practically all high-grade, reliable magnetos and lighting generators are "NORMA" equipped. The reason most owners don't realize it is that their attention is never drawn to parts that so silently, so surely, do their duty. The trouble-making parts are the ones that get attention—and condemnation.

See that your electrical apparatus is "NORMA" equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# American Garage & Auto Dealer

*Published Monthly*

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116 S. Michigan Avenue, Chicago, Ill.

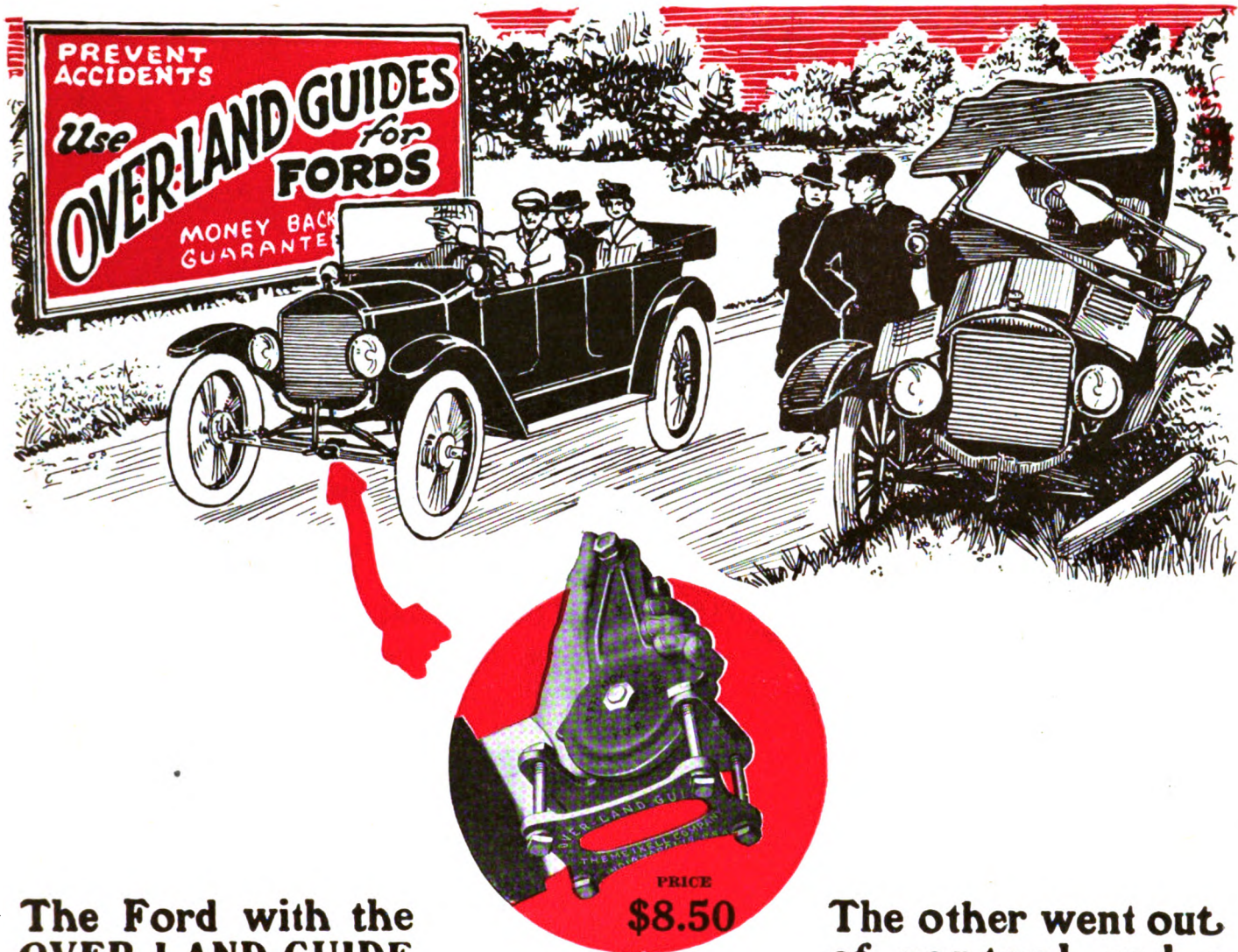
J. R. HASTIE, *President and Treasurer*  
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Entered as second-class matter, March 1, 1916, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879

Subscription per Annum (Postage Paid) \$1.00. Advertising Rates on Request.





## The Ford with the OVER-LAND GUIDE made the turn safely.

Making sharp turns in a Ford equipped only with its standard steering mechanism is a perilous proposition. There is always the danger that the steering gear connecting rod will go over center travel, resulting in loss of control, and such accidents as the one illustrated above. Loss of control may mean the destruction of the car, and the lives of its occupants. A similar accident may occur in case of a blowout in one of the front tires. The wheel with the flat tire acts as a pivot throwing the car to one side, sometimes into a ditch, or causing a collision, with serious or fatal results.

The OVER-LAND GUIDE eliminates these accidents and gives the Ford driver complete control over his car. It relieves him of the usual physical and mental strain

## The other went out of control and a smash-up resulted.

to such an extent that he can steer the car with the tips of his fingers over the roughest roads without danger of losing control.

The OVER-LAND GUIDE, in addition to the safety and easier control that it affords, will save ten times its cost in one year in repairs alone. It bolts to the center of the front axle and the center of the spindle connecting rod (or tie rod) securely, relieving the vibration and strain on the spindle connecting rod (or tie rod) and entire front system, and the steering mechanism up to the steering wheel. It reduces breakage and repairs on the steering mechanism and connecting parts. It effectively stops the wobbling and scooting of the front wheels, saving at least \$30.00 per year in tires alone.

### This Broad Guarantee Protects Users of the Over-Land Guide.

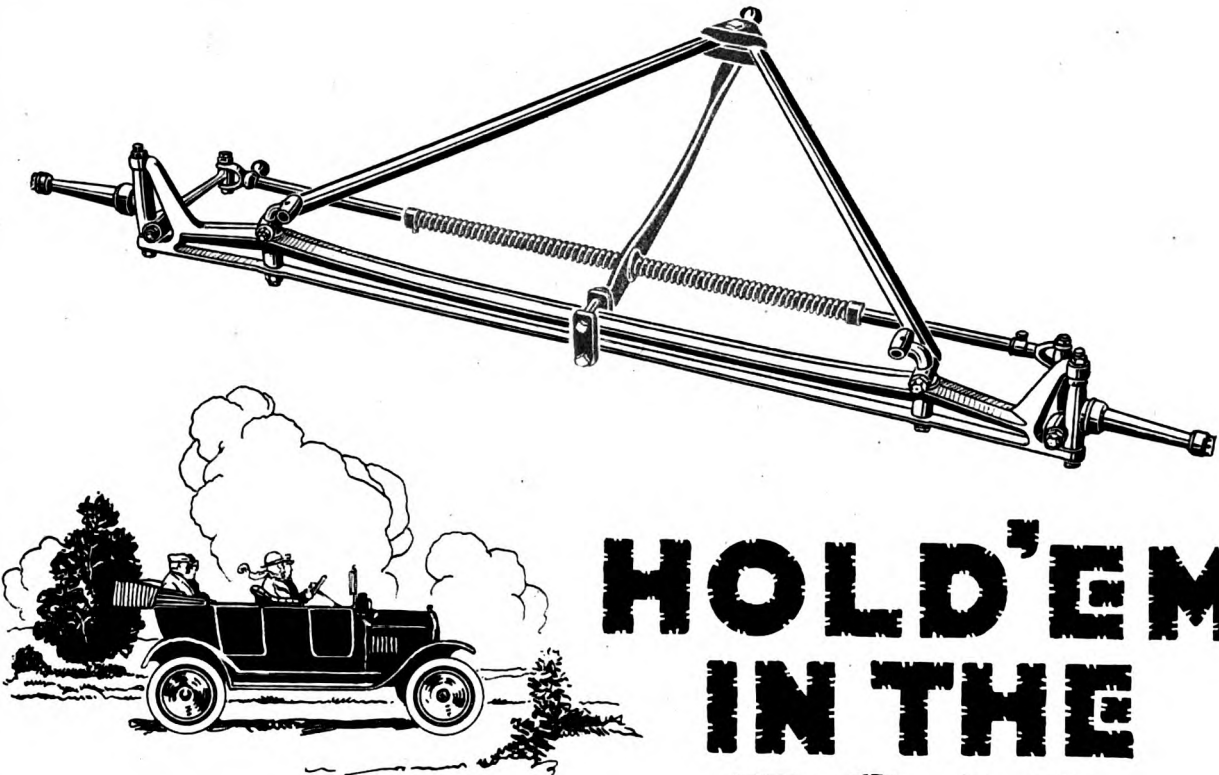
Send us retail price, (\$8.50), and we will send you parcel post, one Over-Land Guide. Use it 20 days, and if at the end of that time you are willing to part with it, full purchase price will be refunded upon its return.

DEALERS—Get your share of OVER-LAND GUIDE profits. Write or wire for full particulars.

## THE MEIXELL COMPANY

Office---216 Board of Trade Building, INDIANAPOLIS, IND.

The Automobile Sundries Company, Exporters, 18 Broadway, New York, N. Y., are the sole foreign distributors of the Over-Land Guide



# HOLD'EM IN THE ROAD

## The Most Essential of all Ford Necessities

As its name indicates, "Hold 'Em in the Road" was designed to give the Ford driver better control over his car. It combines four valuable attachments in one—Radius Rod Brace, Anti-Rattler Axle Support, and Steering Device.

Here are some of the functions performed by "Hold 'Em in the Road":

- Stabilizes the entire front of the Ford car.
- Prevents the axle from buckling or dishing under.
- Stops rattling of the steering tie rod.
- Braces Radius Rod Auxiliary.
- Upholds the tie rod and permits it to float.
- The Compression Coil Springs keep the wheels in alignment and prevent wobbling—giving the wheels added stability when making turns. Prevents breakage, repairs and accidents.

No Ford should be without "Hold 'Em in the Road"

Retail Price \$5.00

Other "CASCO" Products:

- "CASCO" FAN BELT GUIDE
- "CASCO" FORD COIL BOX PROTECTORS
- "CASCO" OIL DRAIN COCK

*Those who offer for sale infringements are liable by law as manufacturers of infringements.*

**DEALERS**—"Casco" Necessities are big sellers among Ford owners. Write for particulars and trade prices.

"Casco" products are handled by all Chicago jobbers.

# Casco Manufacturing Company

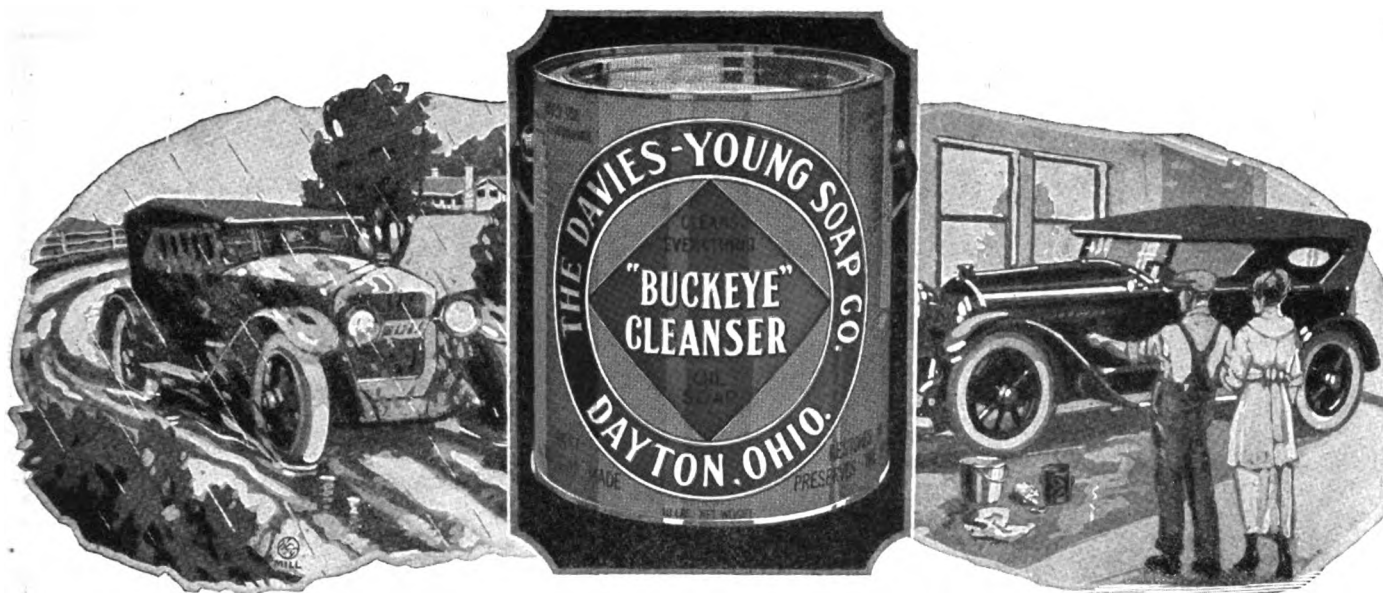
Manufacturers

## THOMASVILLE, GA., U. S. A.

**EXPORTER**  
Chas. F. Lyngaas  
46 W. Broadway  
New York City  
Latin and Mexican

**EXPORTERS**  
Mullen, MacLean & Co.  
11 Broadway  
New York City  
English





## Mud and Rain—Snow and Sleet

*play havoc with the costly polish and finish of the motor car—unless it is properly cleaned and dried immediately*

**T**HE three chief reasons why an auto loses its luster after a grilling drive through the mud and sleet, are—

- (1) it is not washed at all; or,
- (2) it is washed without soap; or,
- (3) it is washed with the wrong kind of soap.

Soap must be used to remove all the dirt, but it must be the right kind of soap. The only safe thing to do is to use a soap that has been tried and tested, and has proven

its merits over a stretch of fifteen years. That soap is the Buckeye Cleanser.

It is made of pure vegetable oil, without a trace of grit or alkali, and designed especially for highly polished surfaces. It not only cleans, but also preserves and lengthens the life of the polish. It keeps the car from looking "run down at the heels."

After a hard trip, use Buckeye Cleanser, and you will be surprised—and pleased—at the results.

*Sold by Auto Supply Dealers, Hardware Dealers  
or wherever auto accessories are handled*

**THE DAVIES-YOUNG SOAP COMPANY**  
DAYTON, OHIO

**Coast Sales Agents:**  
Allied Industries, Inc.  
San Francisco  
Los Angeles Seattle

**Denver Sales Agents:**  
Paramount Lubricants Co.  
Denver, Colorado

**Southern Sales Agents:**  
The Colley-Minnich Co.  
Atlanta, Georgia

# BUCKEYE CLEANSER

THE AUTO SOAP THAT  
CLEANS & POLISHES



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

## Circulation of TIRE-DOH Advertising

	Saturday Evening Post	Literary Digest	American Magazine	Farm Journal	Successful Farming	Christian Herald
Maine,.....	14,172	10,310	4,407	10,346	4,337	2,474
New Hampshire	8,195	4,711	2,638	6,498	2,780	1,743
Vermont.....	6,684	3,278	3,729	6,118	2,898	2,261
Massachusetts	83,690	48,605	66,159	27,705	6,125	6,100
Rhode Island..	10,967	6,478	14,687	3,709	1,177	1,019
Connecticut...	30,716	13,549	12,644	15,235	3,908	3,766
<b>New Eng. States.</b>	<b>154,424</b>	<b>86,931</b>	<b>104,264</b>	<b>69,611</b>	<b>21,224</b>	<b>17,363</b>
New York....	251,952	81,031	129,242	72,537	31,687	25,623
New Jersey....	50,151	21,498	31,597	29,446	5,299	7,332
Pennsylvania..	155,810	75,460	118,761	111,017	44,505	22,525
Delaware.....	3,873	1,604	3,006	4,838	811	634
Maryland.....	21,802	12,775	4,465	15,912	4,552	2,731
Dis. of Col....	23,557	14,134	3,075	1,490	160	754
<b>N. Atlantic States</b>	<b>507,145</b>	<b>206,502</b>	<b>290,146</b>	<b>235,240</b>	<b>87,014</b>	<b>59,599</b>
Virginia.....	32,128	16,459	7,047	20,484	8,937	5,338
N. Carolina...	17,630	12,517	6,898	13,494	5,147	3,494
S. Carolina...	12,134	9,985	5,507	4,058	1,781	2,088
Georgia.....	26,079	18,643	5,614	7,202	2,676	2,201
Florida.....	20,099	9,408	3,912	3,645	1,380	2,172
<b>S. East. States..</b>	<b>108,070</b>	<b>67,012</b>	<b>28,978</b>	<b>48,883</b>	<b>19,921</b>	<b>15,113</b>
Kentucky.....	18,318	13,510	11,263	13,765	11,596	2,749
W. Virginia...	16,46	10,210	5,989	14,901	11,218	2,780
Tennessee....	20,015	18,494	7,071	11,553	9,988	3,462
Alabama.....	17,407	12,111	4,733	8,372	3,346	2,415
Mississippi...	11,041	6,803	4,114	4,165	2,091	1,640
Louisiana.....	15,843	14,058	3,505	3,744	1,802	855
Texas.....	61,779	45,911	14,169	22,657	12,898	5,530
Oklahoma.....	26,409	13,863	8,485	14,570	21,611	1,823
Arkansas.....	13,850	9,171	4,203	7,015	9,159	1,585
<b>S. West. States..</b>	<b>201,130</b>	<b>144,031</b>	<b>63,532</b>	<b>100,742</b>	<b>83,709</b>	<b>22,339</b>
Ohio.....	128,091	66,837	84,307	91,435	73,578	17,371
Indiana.....	53,535	30,526	32,954	40,138	43,175	6,900
Illinois.....	131,535	53,585	99,660	51,388	69,891	13,825
Michigan.....	80,789	32,787	42,020	81,432	46,950	9,236
Wisconsin.....	43,004	18,619	28,613	33,683	39,300	5,540
Minnesota....	48,557	26,745	31,514	27,035	43,201	4,811
Iowa.....	47,747	23,368	36,443	55,248	75,550	10,012
Missouri.....	56,991	30,917	38,262	30,193	47,271	6,285
N. Dakota....	12,670	4,915	5,558	10,099	15,004	2,067
S. Dakota....	12,905	4,958	6,675	11,863	20,621	2,734
Nebraska.....	25,684	14,408	14,965	35,351	34,644	4,901
Kansas.....	31,556	16,314	19,559	32,212	38,246	7,216
<b>Middle States..</b>	<b>673,064</b>	<b>323,979</b>	<b>442,530</b>	<b>500,077</b>	<b>547,644</b>	<b>90,898</b>
Montana.....	21,128	9,122	7,213	6,866	11,620	1,638
Wyoming.....	5,207	2,263	2,015	2,440	2,079	485
Colorado.....	28,979	15,661	10,968	9,289	12,019	3,011
New Mexico...	6,028	3,221	2,570	1,817	1,338	563
Arizona.....	10,767	4,503	2,691	1,153	1,006	445
Utah.....	10,172	7,996	2,766	2,897	3,224	203
Nevada.....	3,342	1,593	683	798	573	116
Idaho.....	10,747	6,439	4,410	4,469	957	1,124
Washington...	51,582	25,387	15,456	12,330	992	4,091
Oregon.....	27,580	13,217	9,572	8,382	925	2,682
California....	141,277	58,454	29,839	14,806	6,631	8,733
<b>Western States..</b>	<b>316,809</b>	<b>147,856</b>	<b>88,183</b>	<b>65,247</b>	<b>99,964</b>	<b>23,091</b>
<b>Miscellaneous...</b>	<b>132,447</b>	<b>31,349</b>	<b>19,285</b>	<b>9,118</b>	<b>882</b>	<b>8,277</b>
<b>TOTALS.....</b>	<b>2,093,089</b>	<b>1,007,776</b>	<b>1,036,818</b>	<b>1,028,918</b>	<b>820,669</b>	<b>261,859</b>

TOTAL CIRCULATION

**6,249,129**

## Now is your chance to "cash in" on the force of this National Advertising for **TIRE-DOH**

THE dealers who have handled TIRE-DOH in the past have found it a consistent seller and profit maker. The profits that the trade have made on TIRE-DOH in the past will be surpassed this year.

Our national advertising campaign will reach over 30,000,000 readers of the six great magazines in which TIRE-DOH advertisements appear. Millions of car owners will become acquainted with TIRE-DOH through this advertising. They will learn how they can quickly, economically and effectively repair their own tires and other rubber goods as well.

The table shown on this page will give you an idea of the number of people in your territory who will become acquainted with TIRE-DOH and will soon be asking for it.

In addition to our national advertising, we furnish active dealer helps, including Window and Counter Display Cards, Newspaper Electros, and Circulars.

If you are not already  
handling TIRE-DOH, write  
today for full information.

**Atlas Auto Supply Company**  
680 W. Austin Ave. CHICAGO





# American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,  
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XI. No. 3

CHICAGO

March, 1920

## Economic Problems of Farmers

In a recent address at Chicago, Herbert Hoover declared that the development of agriculture, to keep pace with the development of industry, is one of the greatest reconstruction problems facing the country. The industries are drawing workers from the farm and if we should develop our exports of industries in the next five years as we have during the last five years, we shall by that time be faced with the necessity of importing food-stuffs.

In Mr. Hoover's opinion, the prime problem is to make the agricultural industry economically attractive so that it draws into its service its full proportion of American life, in order that it can keep pace with industry in its rapid development. Two primary facts stand out after a consideration of practical measures for accomplishing this.

The first is that the farmer's main production must find its market either in the great industrial centers along the Atlantic seaboard or, alternately, in export to Europe. In either case, the prices in normal times are made primarily by competition with other great sources of the world's food supply. The farmer's prices are thus only remotely regulated by the cost of production.

Whatever the economic argument may be, the outstanding fact is, for all practical purposes, that the farmer's level of prices is made by the

world prices of food as interpreted at the point of delivery, and during wide periods of time he is underpaid. On the whole, he was not underpaid during the war, but recently the tide has begun to turn against him.

The second great fact that would be developed in inquiry Mr. Hoover

There is an old saying that: "Empty wagons rattle." You can prove the truth of it any day by a little observation. The individual who is always talking, who has an opinion to offer on every occasion; who considers himself an authority on every subject, is of the rattling type. His words are usually an evidence of an empty mind rather than a full one.

The owl gets its reputation for wisdom because of silence. Don't be an owl! Don't be an empty wagon! Be an OBSERVANT, THOUGHTFUL, EARNEST, TEACHABLE individual, created in the image of God—a man whose words and acts shall count because of their soundness and saneness.

stated, is that the American farmer receives a less proportion of the consumers' purchase price for his products than the farmer of most other civilized countries. That is, the margin between the farmer and the consumer is the widest in the world. This margin comes partly out of the consumer, but predominately out the farmer.

If it is assumed that the basis of

price, which is fixed by world forces, is not to be remedied, the line of practical remedy to the farmer lies in decreasing the cost of placing his products into the hands of the consumer.

Other points of attack of this problem were outlined by Mr. Hoover, such as the removal of every impediment to free trade in produce, increased transportation facilities, reduction in the number of people engaged in the distribution of food supplies, co-operative distribution among producers, and standardization.

"Another field of interest in agriculture to engineers lies in its mechanical equipment," said he. "Our American engineers have replaced manual labor by machines to a remarkable degree. This mechanical development has raised the whole economic and social status of our farmers to a point far above their European cousins. There is yet a great field of engineering for further assistance to the whole country."

It is in the words of this last paragraph that we are particularly interested—the use of mechanical equipment on the farm. Those who have been associated with Hoover in his various activities have been impressed with his ability to correctly analyze all the factors involved in a problem and indicate solutions based upon sound economic principles and practical foresight.

His conclusion, that "there is yet a great field of engineering for further

assistance to the whole country" in the development of farm mechanical equipment, is one that should have serious consideration by automotive dealers in the rural communities. A keen interest in the solution of problems of the farmer should result in mutual advantage.

### Just Between Us!

In the editing of the AMERICAN GARAGE & AUTO DEALER, the idea kept constantly in mind is to produce a paper which will have something in it each month that will interest the greater number of readers. The editors are, therefore, especially gratified at the number of communications which in the past few weeks have been received for publication. They show clearly that every department and every article is read carefully.

When reading of the methods used in one garage, the readers are reminded of a method or expedient which they have used successfully. It may be better than the one described, or have a feature that is better; so they sit down and write their ideas in their own way and send them in to the offices of the AMERICAN GARAGE & AUTO DEALER.

Of course, all of these letters can not be published, as more than enough are received to fill the allotted space. Nevertheless, we are anxious to have garagemen send in their problems, solutions, ideas and other items, that all may profit from the experiences of others and thus enlarge and improve every department of the paper.

There may be delay in publishing some, but the policy is to publish all good ideas as soon as possible. Therefore, a careful selection has to be made in order to present to the readers of the AMERICAN GARAGE & AUTO DEALER matter which will be of practical use to them.

The various communications indicate that our readers are interested in the matter published, all of which, as previously stated, is extremely pleasing to the editors.

### Working with a Will.

It is pretty hard to condemn or be angry with the man who is doing his best, even if he doesn't quite succeed. There is enough charity in the human race to induce nine out of ten people to say:

"Well, he tried hard; he did the best he could, and he ought to be given

to succeed. Most failures are due to neglect of laws of sincerity, earnestness and thoroughness.

The man who convinces the people that he is doing his utmost to supply them with the best possible service, will be surprised to find how considerate his customers will be. The chances are this consideration will be due, primarily, to good service, for even the most stubborn conditions yield to conscientious, painstaking effort. But anyway, the knowledge that one is doing the best he can, goes a long way to excuse the mistakes that may creep in.

Do the best you can at all times, and the battle is more than half won. If you don't, the fault will certainly be on your head if the battle is lost.

### What About Supervision?

In all lines of business, a certain amount of time and money is charged to the supervision account, directly or indirectly. In some cases the amount expended for supervision forms a startling percentage of the entire cost of conducting the business and yet, if it were not spent, the loss on mistakes due to carelessness would be, in the aggregate, considerably more.

The less supervision a man requires, the more responsibilities are given him and the greater pay he receives. The man who requires the least supervision is the man who is accurate—the man who uses his head.

He is the man who can clear up the problems when other men find themselves at sea. He is the man who, when given a job, does it thoroughly and in such a manner as to produce results without a heavy expenditure for supervision on the part of his employer. Skillful, competent workmen are the highest paid, for they require minimum supervision. It's true about "the high cost of supervision."

## Come Across!

By C. P. McDONALD

**Come across with the best you have in you, with a wallop backed up by a brain; never whine that the fates are "agin" you or be so darned quick to complain; but pick up the hoe and go grubbing, just winnow the gold from the dross, break away from the drowning and dubbing—show the world what you've got!**

*Come across!*

**Come across with the faith of a leader, show your handog persistence and grit, for the practice of trying's a breeder of those things that make a man "fit"; don't quit in the race you have started or figure each failure a loss, the world is too small for half-hearted endeavor—brace up!**

*Come across!*

**Come across with the vim and the vigor that blessed you the day of your birth, make the big deeds forerunners of bigger, for the doer inherits the earth; to the quitter black clouds seem the blacker, the buried stone gathers no moss; get out of the class of the slacker—show your mettle and force!**

*Come across!*

(Power)

credit for that, even though he did fall down partly."

Whatever is one's daily work—running a garage or selling automobiles, repairing cars or tractors, preaching sermons, planting and harvesting crops, writing funny stories, or playing baseball—it should be done earnestly, honestly, and sincerely. "Angels could do no more." The man who puts the best there is in him into his day's work, can be content to leave the result with the powers that be.

In the nature of things, he who does the best he can is nearly always sure



The Present Home of the L. A. Morgan Co., Brookline, Mass.



The Service Truck and One of the Billboard Advertisements.

# From \$25 to \$60,000 in Three Years

The Story of How L. A. Morgan on \$25 Built Up in Three Years a \$60,000 Trade—He Proved the Old Time Proverb for the Eleven Millionth Time that "Where There's a Will There's a Way"—Read Mr. Morgan's Way

"They told me that in six months I would close shop, but I'm still open and expect to do a business of \$100,000 during 1920."

This sounded interesting to us and so we asked Mr. Morgan—better known among his many friends and customers in Brookline, Mass., and within a radius of 100 miles or more, as "Morgan, the Dodge Man"—to tell us how he got started in business. It didn't take him very long to give us the high lights, but our questions brought out facts and ideas which he has discovered and applied in the development of his business.

"It was in May, 1915, I started to work for the ——— Motor Co., a Dodge Bros.' agency, as foreman of the service station," said "Morgan, the Dodge Man." "At that time we only employed eight men, but as business got better more men were hired until as many as 60 men were employed during the busy months. All went well from the start, but later, differences came up from time to time concerning the work. They wanted to do it one way and I another, so finally I quit in October, 1916.

"It was then that one of the cus-



The Happy, Satisfied Workers of the L. A. Morgan Co.

tomers told me to go into business for myself and suggested that I could make more money. But I was somewhat afraid and, besides, I had practically no money.

"The customer finally persuaded me to go into a partnership arrangement and advanced \$300 while I invested only \$25—my week's pay—and my experience.

"We started in a little shop and with as little equipment as was necessary to do ordinary repair work. We maintained only a small office and stockroom. An automatic time clock was installed for recording on cards the time a man started on a job and when he finished. The difference in time was the amount we charged the customer for repair work.

"If any material was needed in con-

nection with the work it would be entered at once on the time card. In this way we saved the wages of a stockman and obtained an accurate record of what was used in the way of parts and supplies. Besides, the amount of clerical work was cut down to such a minimum that I was able to do all of the bookkeeping and billing in the evening.

"At that time we employed only a few men and, of course, I pitched in with the rest and worked as one of them. This helped me to keep in close touch with what was being done and aided me to see that the work was being done right. Besides, my presence tended to speed up the work and created a feeling of friendship."

"How was business from the start?" we asked, somewhat anxious to know whether it was hard going or not.

"Business was very good and during the first year and a half amounted to \$1,000 a month. In fact, it was so good that in six months I was able to buy my partner's share in the business at a cost of two for one.

"Then for the next nine months, business steadily increased until the shop became too small and I was forced to move to larger quarters.

"In March, 1918, three months after becoming incorporated as the L. A. Morgan Co., I moved into the present location."

It may be of interest to our readers to know that the L. A. Morgan Co. is located in Brookline, Mass., a suburb of Boston. Its business, however, does not only come from Brookline, but from Boston and towns within a radius of 30 miles, and "Morgan, the Dodge an" is not only known in Brookline, but also in Boston, Lynn, Salem, Cambridge, Natick, and as far as Province Town out on the Cape.

The building which the company now occupies, is a one-story brick structure, 60 by 100 ft., of modern construction, well lighted and ventilated. In it are an office, a stockroom, a battery-charging and repair shop, and the general repair shop.

The office is situated in the front-right-hand side of the building and is well supplied with office equipment for properly recording and filing the work. Three girls are employed to handle the correspondence, the writing of orders, the making out of bills, and for recording and filing.

The stockroom is in charge of a man whose duty it is to issue all the necessary parts and tools for repair

work and keep the stock up to requirements.

The battery shop is equipped to handle all battery charging and repair work while the general repair shop is

such as replacing tubes, vulcanizing punctures, etc.

"We are contemplating showing and selling accessories, tools and supplies," said Mr. Morgan in answer to a question. "Every car owner whose car is in our shop for repairs is a prospect and this offers us a good opportunity for profits in this line. At present, however, we haven't the room to spare."

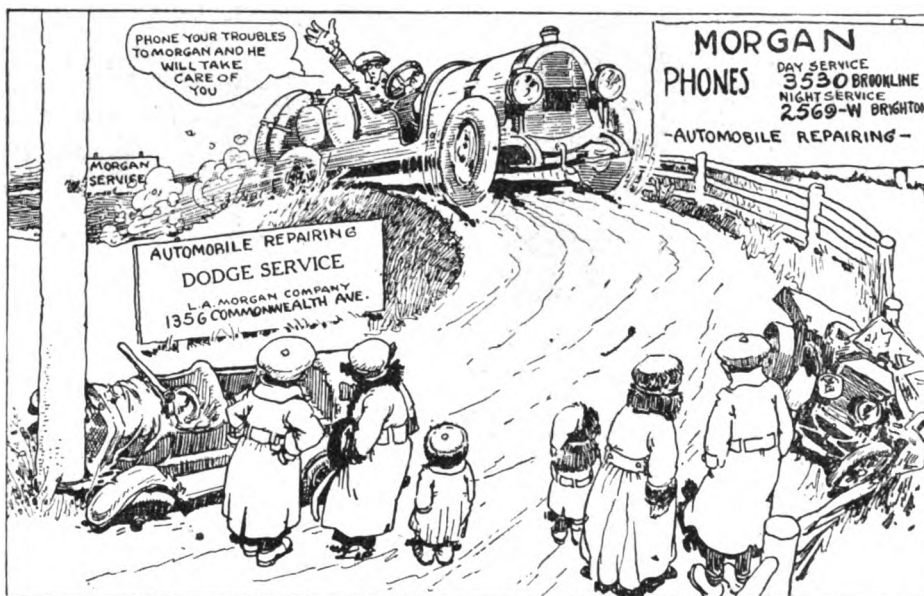
When asked if he did any advertising when he started in business, Mr. Morgan answered "Yes" and added: "From the start we sent out circular letters to the own-

ers of automobiles in and around Brookline, Boston, and vicinity.

"These circular letters were of the human interest kind, an attempt to get 'under the skin' and that they were successful is shown by the fact that car owners would come in a year later with these circular letters as an introduction.

"Furthermore, shortly after they were sent out, we had to give up the idea of mailing others because we received more work than we could handle.

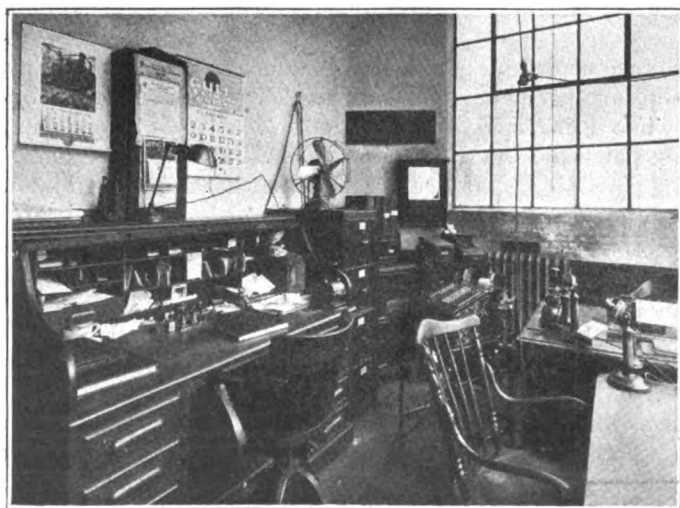
"I have also sent out, at various times, postcards offering to do winter repair work at special prices and these, too, have proven successful, and en-



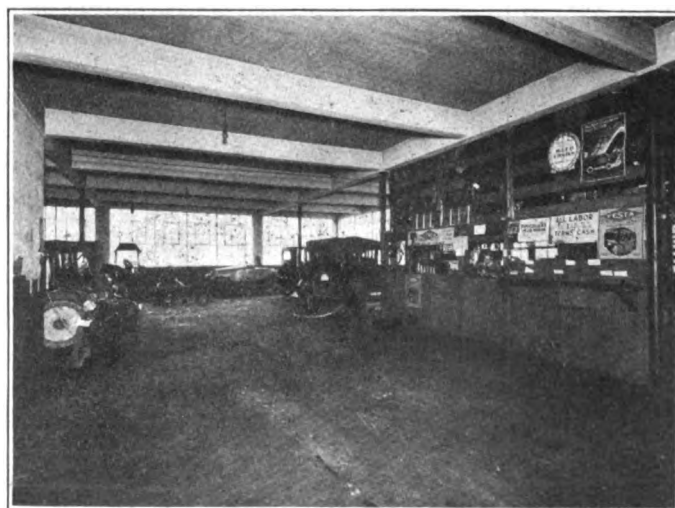
Post Card Which L. A. Morgan Co. Sent Out to Advertise Its Service.

equipped with lathes, drill presses, emery wheels, grinding and reboring machines, electric drills, steam-hammer, welding outfit and special labor-saving tools and devices. Last summer 24 men were employed, but during the past winter only 18.

There is no display room or salesroom for accessories and tires. These are kept in the stockroom and sold only as an accommodation. Both cord and fabric tires are sold and chains, bumpers, and only such accessories as are in demand in connection with repair work are kept in stock. Some tire repair work is done as an accommodation to the trade, but this work is mostly confined to minor troubles,



Office Equipped to Handle Accounting Efficiently.



View of Repair Shop—Also Stockroom and Job Card Rack.



abled us to have cars to be overhauled in anticipation of a slack season.

"In connection with these letters and cards, I also had two advertisements on billboards on the main streets in town. I reasoned that all people cannot be reached by mail, some being too busy to stop and read the letters. So I employed this advertising on the streets where everyone passing by could not fail to see it.

"This form of advertising has proved very profitable, for time and time again owners come in with their cars and say: 'I saw your advertisement on Commonwealth Ave.' I might add that these billboards constitute the only advertising that I do at the present time."

Another thing which we were interested in was whether business increased enough after Morgan had moved into larger quarters to justify the renting of such a large repair shop, and so we asked him how his business has been since he moved into his new place.

"Business has been exceptionally good," he replied. "In fact four months after moving into the present shop I found it too small. At times during the summer months, work piles

Do you give away free of charge any service to your customers? The L. A. Morgan Co. gave away \$5,000 during 1919, rather than have a dissatisfied customer.

"Never give a customer a chance to get sore," says Mr. Morgan. "Give him something free first, and above all have him make his kicks personally.

"Charge for what you do and give the customer a square deal. Don't take the attitude of 'get it while the getting is good.' One satisfied customer is the best advertisement you can possibly obtain and it costs you practically nothing."

up so rapidly that we actually have to climb over the cars to get out at closing time.

"During 1918, the second year in business, I did work amounting to \$37,600. The first of January, 1920, showed a business during 1919 of \$59,969, with a stock on hand of \$7,582.26. Accounts receivable, equipment and service cars, \$4,000. This year I expect to do a business of \$100,000. As I said before, the shop I am in at the present time is getting

too small and so I am thinking of building a bigger place.

"It may be of interest to know that each job since the business started has been numbered, starting with one and at the present time the job numbers run in the 5,900—practically 6,000 jobs in little more than three years."

Realizing that our readers would be interested in knowing what factors contributed to his wonderful success in such a short time, we asked rather pointedly—"To what, Mr. Morgan, do you attribute your success?"

He paused for a few seconds, and then said: "Principally, it is the result of an honest business policy and hard work. I believe that service is founded on squareness. Charge for what you do and give the customer a square deal. Don't take the attitude of 'get it while the getting is good.' One satisfied customer is the best advertisement you can possibly obtain, and it's cheap.

"In this connection last year \$5,000 worth of service was given away free to my customers. Some of them were not entitled to it, but were given it rather than have an argument and a dissatisfied customer. Furthermore,

(Continued on page 50.)

## L. A. MORGAN COMPANY, Inc.

Day Tel. Brookline 3530  
Night, Brookline 67214

### DODGE REPAIRS

DODGE CARS  
BOUGHT AND SOLD

All work under the personal supervision of L. A. MORGAN, formerly General Manager,  
Dodge Bros. Car Service Station, Boston

134 COMMONWEALTH AVENUE, (THREE FIELDS GARAGE)  
ENTRANCE, 4 WALBRIDGE STREET

Dear Sir

As an owner of a Dodge Car let me tell you a few facts regarding the kind of service which we render to Dodge owners.

The writer has worked on Dodge Cars almost exclusively since the first car was brought to Boston, as General Foreman of the Dodge Service Station, and for the past 18 months with the L. A. Morgan Co.

While in business here we have handled over 1200 Dodge Cars satisfactorily, due to the fact that all of our mechanics are men of long experience and have all the special tools needed to repair Dodge Cars

We take pride in our work and endeavor to please and to satisfy our customers in every detail. By adopting this policy we have found that our customers are our friends and advertisers.

Bring your car to our shop, which is in the Three Fields Garage, (Walbridge St. entrance) one block beyond the Dodge Service Station, and let the writer or one of our testers go out with you and tell you the trouble with your car. We are always glad to render this service to Dodge owners free of charge. While your car is in our shop for repairs you are not only AT LIBERTY TO INSPECT THE WORK WHILE IN PROGRESS BUT ARE ALWAYS WELCOME.

We have recently added a Battery charging and repair plant to our equipment, and can guarantee to give you the best battery service obtainable at reasonable prices. No charge is made for the testing of batteries or the addition of distilled water

If you are contemplating having your car looked over for spring use, we have a very attractive proposition for the next month which it will pay you to investigate. Our prices have not been advanced with the recent raise among dealers and service stations

Trusting you will give us a trial, we remain,

Yours truly,

L. A. MORGAN CO., Inc.

H/LAM

President

## L. A. MORGAN COMPANY

### DODGE REPAIRS

All work under the Personal Supervision of L. A. MORGAN, formerly General  
Foreman Dodge Bros. Car Service Station, Boston

9-11 PEARL STREET (Brookline Village)

Tel. Brookline 3530 and 3944

North East Service  
Ignition  
Lighting and  
Starting Specialists

BROOKLINE, MASS

To the DODGE OWNER

Now is the time to have your car looked over for winter and spring use. We are in every way qualified to look after your car and render you 100% service. We have increased our business at the rate of 100% a year during the past three years, and consider that this increase is due only to our policy of dealing absolutely fair with our customers, and giving them perfect satisfaction

We operate the largest, independent Dodge service station in New England, having handled over 6,000 jobs in our establishment since its inception three years ago. We have all special tools required for the quick and efficient handling of Dodge cars. Our men are all experts, each one a specialist in his own line. Our shop is always open to the pleasure of our customers to inspect their work while in progress. We have not found it necessary to keep our customers out of our shop, as we do not use boys or inexperienced help on their cars

Do not wait until spring for the overhauling and tuning up of your car, as there is a scarcity of parts, and although we are doing everything to protect our customers from this shortage, we are unable to obtain more than a three months' supply.

We will be pleased to quote you prices on winter storage, battery storage, painting, or overhauling, or to take your car and overhaul it and take care of it for you and deliver it to you ready for spring use. Our electrical department takes care of all makes of batteries and generators, quickly and efficiently

Why not come in, and let us test your car, and estimate upon any work that you may desire? A visit to our busy shop will convince you that we satisfy customers

Very truly yours,

L. A. MORGAN CO. Inc.

*L. A. Morgan*

# Mr. Garageman! What Is Your Salary?

Should You Draw a Salary or Use the Cash Drawer as a Creditor of Your Home Needs—More Than One Garage Owner Found Himself on the Rocks Because He Failed to Recognize His Services as a Business Debt—What Are You Doing?

By Lester G. Herbert

There seems to be a great difference of opinion as to what salary a man should draw when he is in business for himself. Some feel that he should have as much as he could earn if he were working elsewhere; others think that he should draw as much as is required to live on and to support his family in keeping with the character of the business which he is conducting.

Both of these conclusions are wrong. Take the matter home to yourself for example: If you were working for someone else, you would get what you would be worth in that position, or else you would lose your job. In other words, you would have to make good or give place to someone else.

Again, if you are in business for yourself and were to draw whatever seemed to be necessary to live on, you would be almost sure to let your expenses run beyond what the business could actually carry with safety. This would be unwise and dangerous and would lead to financial embarrassment sooner or later.

If you should decide, however, that you should pay yourself as much as you would pay to someone else to fill the position properly, you will come nearer the mark. This should not be an extravagant salary, but a fair and reasonable fixed recompense. You will then feel that you are receiving adequate remuneration for your time and that you are having an opportunity to show what you can do in the way of building up a business.

Naturally you will want to succeed and you will want to know whether you are succeeding or not.

If your capital stock is not increasing in value or earning dividends, you might as well work for someone else and save the care and responsibility incident to the proper conduct

different management, new blood, a more up-to-date policy, or an out-and-out sale.

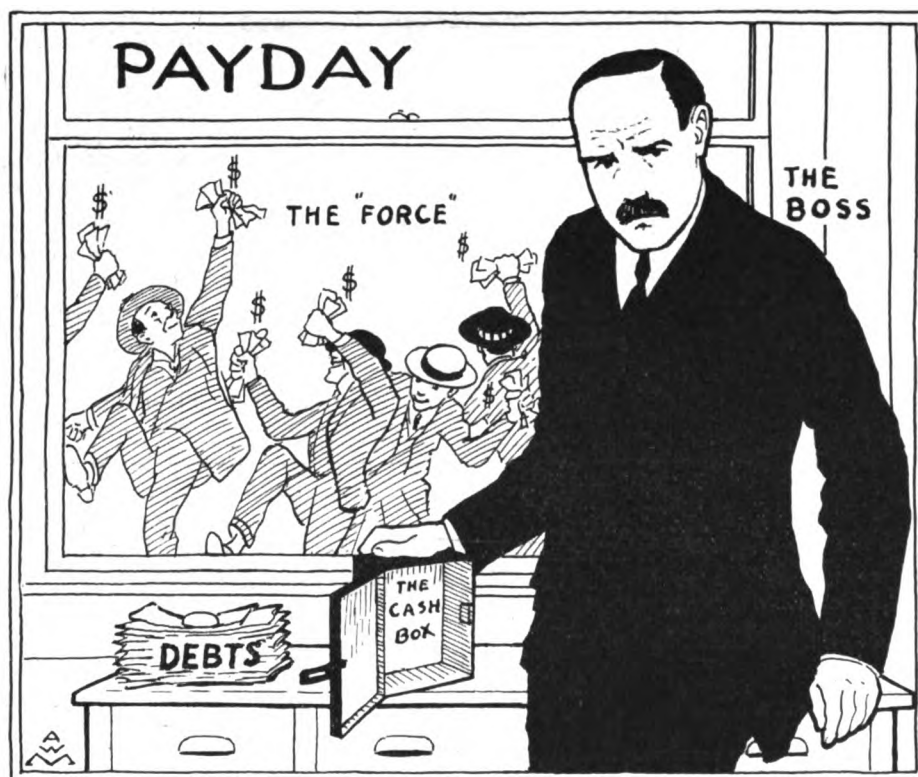
When, however, the business shows a profit, as it should, the sum of the net profit should be regarded as an amount quite by itself.

Part of the net profit should be set aside for re-investment in the business; part should constitute a safety margin in case of an emergency. And in case the profits are sufficient, a fair percentage should be awarded to the proprietors, partners, stockholders or owners. This encourages everyone concerned to do his best and to work for the advancement of the business, for in so doing he is building up a larger and more valuable property for himself and insuring future prosperity.

Just as soon as the business will not pay a fair living wage for the man at the head he may be certain that something is wrong. And if every endeavor to better conditions fails, it is rare indeed that it will pay to continue trying to keep a concern afloat which offers so little encouragement.

The case comes to mind of a man whose business dropped off so badly that he cut down his own salary in order to have more with which to pay bills. At last it became impossible for him to take any salary at all. The business was getting into debt and his home expenses were running behind. Naturally he was much distressed, for he saw bankruptcy ahead.

(Concluded on page 44)



At Last It Became Impossible for Him to Take Any Salary at All.

of an individual business enterprise.

The best way is to take a thorough and careful inventory once every six months, so that you will know the gross and net profits for that period. If the business shows no profits something is wrong—either the overhead expense is too high; the aggregate volume of business is too small; business does not provide a needed service; too much competition; or it is operating without the necessary credit to tide it over emergencies.

Whatever the trouble is, it should be located and remedied, for delay is sure to prove dangerous. If, after reasonable time the business does not show improvement, then drastic measures should be taken in the way of a

# Some Novel Stunts in Advertising

Are You Using Time-Worn Ideas to Arouse Curiosity in Your Business?—  
Is Your Advertising of the Uninteresting Kind?—Does It Lack Responsive-  
ness?—Why Not Try That "Something New"?—A Few Good Stunts

By Ernest A. Dench

*Author of "Advertising by Motion Pictures"*

The advertisement which succeeds in arousing the curiosity of the public has accomplished its prime object. The inevitable "something new" is to this advertising device what sugar is to coffee. Time-worn ideas are absolutely futile, because you cannot arouse curiosity over something which the public already knows.

The "something new" which I have to propose is the "put-together" photograph. Select several photographs of popular photoplayers—you can obtain them from the local motion picture exhibitor for a few cents apiece—cut them up into unequal lengths and have cuts made of the pieces. Run one or more cuts at the head of your regular newspaper announcement. I am going on the assumption, of course, that you use display announcements and change them regularly. Start off the advertisement somewhat along the following lines:

"Who is this movie star?

Each week, until the picture is completed, will appear a portion of a favorite player.

Save these advertisements until the pictures are completed. Paste the pieces together on a piece of paper and tell us who the players are. To the first person doing this correctly we will present any automobile accessory you may need."

Another excellent plan, if you do no newspaper advertising, is to paste a piece of a "put-together" photograph on a white board in the middle of your store window. Announce on a neat card at the side:

"Watch this window display day by day and guess who the players are before the picture is completed. The person making the first correct guess will receive an automobile accessory."

The beauty of the foregoing plan is that it does not necessitate the expense of having cuts made.

The interest manifested in the screen idols is so great that the popularity of either stunt is practically guaranteed from the outset.

Do you know that there are still folks who have never seen a motion picture? They are rarer than the vintage who has never traveled on the

one from some national advertiser whose product you handle.

Then arrange with a local motion picture exhibitor to present an hour's performance one morning to comprise your advertising reels, a short comedy and a short drama. The total expense should not be more than five dollars.

Invite the reporters to attend the performance so that they can write up how the pictures impress the unique audience. The publicity gained as a result of the stunt will be worth several times its cost.

How do film favorites sign their names? Heaps of photoplay enthusiasts only write to their favorites in order to obtain their autographs. They are disappointed in the majority of cases because the letter is signed by the secretary.

Ascertain who possesses the most extensive collection of film stars' autographs in your town. Offer the collector suitable remuneration, if he does not consider the publicity sufficient payment for the loan of his collection, for a few days' window display.

To draw attention to the window display have a slide prepared and throw it on the screen of the local motion picture show. Here is the copy:

"Make a special point of seeing our window display this week. The largest collection of film star autographs will be on exhibit."

At the present time the schools and churches in various parts of the country are, more or less, adopting the motion picture as part of their educational courses. They are for the most part only too glad to receive the free hire of a film depicting how "Automobiles Are Made" or some topic of



Slides at the Local "Movie" House Are Profitable Business Getters.

railroad; consequently there should be a few pickings in your town.

No determined effort has been made to convert such folks and thus destroy their prejudice, so the first move in the right direction is to insert a small want advertisement in the local newspaper:

"Those who have never seen a motion picture show will hear to their advantage if they communicate with Box C, care of this newspaper."

This should draw them out of their wall of reserve. The next step is to send them a letter to the effect that you are arranging a special performance at the Blank Theater on a certain date, at a specific hour.

Next send write-ups to the local newspapers relating to the forthcoming unique performance and emphasize the fact that the featured picture will be the one dealing with the automobile business. Use your own reel, if you have had one produced, or hire

similar nature. Films along these lines blend well in that they possess educational qualities for school and church use, as well as indirectly boosting your automobile business.

Every town has its quota of doubles of movie stars. Perhaps that demure little girl who lives on the hill is the very image of Lillian Walker and is always hailed as "Dimples the Second" by all her friends. You may bet your life that the "double" has been advised time and time again to go into the movies, but the mere fact that a girl resembles Lillian Walker or some other star is no stepping stone to film-dom.

Such a girl may have an advertising value locally, although not nationally. A dandy plan would be to find at least two "doubles" resembling different players and put them up for popular vote. Give a certain number of votes with each purchase made at your establishment. Thus, if there are more Lillian Walker fans than Marguerite Clarke fans in your town, the double of the former will be elected. Make the successful candidate a present of a good line of automobile accessories.

The subject matter of the movie film might show the various emotions expressed by the double while using your prize on her automobile. Such a motion picture will not cost more than two figures to put on, while the amount of business it should influence will be a thousandfold.

#### Manufacturers and Dealers to Adhere to Business Contracts.

The year 1920 will see a strict adherence to the delivery schedules in motor car contracts between manufacturers and dealers. If the dealer is unable to deliver cars to his customers immediately upon their receipt, he will make arrangements to store the cars.

Every dealer has learned that the automobile business can not be conducted as it has been in the past. The dealer must arrange to finance his business so that cars can be put in storage during the dull period in selling. Indeed, the car manufacturer will not make a contract with a dealer who will not thus



**WATCH THIS WINDOW**

*Display Day by Day and Guess Who the Players Are Before the Pictures Are Completed.*

*The Person Making the First Correct Guess Will Receive an Automobile Accessory.*

An Interest-Arousing Window Display Card.

arrange to operate his business. This has been brought about by the fact that the automobile or truck dealer has found that in order to obtain his units, he must co-operate with the manufacturer so that he in turn obtain his material in from six months to a year in advance, enabling him to lay out a fixed production schedule.

The unit manufacturer is a permanent part of the industry. He is indispensable to the vehicle maker. The uncertain labor situation, the changing material market, together with the rise and fall in demand for motor vehicles,

have demonstrated conclusively that the motor and accessory manufacturers make it possible for car and truck builders to produce and market quality vehicles more economically than could be done under any other plan of manufacturing.

#### Unusual Service Feature Installed by Columbia Distributor.

The Columbia Motors Co., manufacturer of the Columbia Six, has just received word from its distributor in Sacramento, Calif., that in building the new sales and service station there, eight baths were installed for the convenience of tourists.

This looks like a practical idea. Thousands of tourists this season will adopt the camping-out plan, carrying their tents and equipment either on the running board or in trailers.

In these days of congested hotels when it is almost impossible to get accommodations at any price, camping out on an automobile tour is the ideal plan.

The scheme of this Columbia distributor is an excellent one. It is hard to imagine any service which hot, dusty tourists would appreciate more than the facilities of a well-equipped bathroom.

If this idea is followed by other dealers throughout the country, it will do much to smooth out one of the greatest inconveniences of touring.

#### Unusual Method of Effecting Sales Adopted in Manchuria.

A motor vehicle importing firm in Manchuria has had to adopt the club-roulette scheme to dispose of some of its importations, says a late report of the U. S. Department of Commerce and Labor.

The system consists in placing a stated number of cars in a pool and selling them at a fixed price on monthly installments, the buyers becoming members of the "club." Each month there is a drawing, and when a member of the "club" draws a car, his payments cease at once and he becomes full owner of the car without further obligation. The remaining members continue their payments until the cars are all drawn or paid for.



A Garage Owner, With Keen Foresight for Advertising Possibilities, Supplied the Traffic Policeman in Town With a Sunshine Umbrella—When Tourists Passing Through the Town Inquired for a Garage, the Policeman Immediately Directed Them to the One Kind to Him.



# "A Garage Is One Thing After Another"

"When I Think I've Got This Bizness Down Fine Some Blaim Thing Comes Along and Gets Me All Mixt Up—The Next Day the Boss Kiks About Too Much Stock of Things and All the Time He Ekspects You to Smile at 'em"

By Frank Farrington

Deer Pete:

Just as I think Ive got this bizness down fine sum blaim thing cums along and gets me all mixt up. Buleve me, this running a garaje is just one — thing after another as shaikspeer sed.

The boss sayz Ime a general you-tillities man and if thats what it is to be a general, Ime glad I diddent haf to be a buck private. Ever since Ive bin here that Persy has bin trying to get sumthing on me. I thought I had a good one on him today when he broke the oval glas in the frunt of a shocase we kepe acksessorys in. He leend on it too hard. I told him shocases was maid to sho things in, not to hold up fokes with rubber back-boans.

He sed, "Thats so willie. I suppose Ile haf to put a new glas in this case. When you go down strete with the male next time, you go into Ericksons hardware store and tel em I want to borrow their glas bender."

I never herd of a glas bender before but it sounded all rite to me becaws the glas in the frunt of that case wood haf to be bent, so I went into Ericksons and askt the man there.

Gee, he giv me the hee-haw rite off the reel. "Who sent you heer for a glas bender?" he wanted to kno. I told him Persy was the guy. "Well," he sayz, "youre sum eezy mark, shure enuf. I suppose if he sent you out to get a box of auger holes or a pound of white lamp black, youd fall for it. Sav. you must be prettie grene."

Then I saw it was a joak on me. There aint enny such thing as a glas bender. What dyou know about that? Well, I lern sumthing most every day

that aint in a book. Ile get even with that Persy yet.

The other day I got a prettie good ideeah and I forgot to write about it becaws I thought Ide wate and see if it turned out all rite.

I herd the boss telling Bob there was too much stock of 2 or 3 different things in the stock rume—spark-plugs and electric lamps and hand pumps was what they was. He sed he wanted that extra stock sold out

everyboddy to see those things and aint that a good way to maik em see em?"

Bob sayz he gesses Ime rite and I admit it so that maiks it unannymus.

Wel we tride it and Spike and Bob both sed they never had enny skeem that worked so good and maiking sumthing sell rite off the bat. The boss sed to Bob, "I guess you put it over that time all rite," and Bob sed, "Ask Bill. Heze the guy that suggested putting up a stand out in the strete."

It diddent taik so much branes to figger it out at that. When you dont see things you dont think about buying em and lots of fokes that wood buy things never get inside of our garaje at all. When a feller is waiting for you to fil his gas tank he dont do ennything but rubber, so you want to give him sumthing to rub-

ber at. Aint it so? He sits there and sees that little sine reeding "Got an extra lamp along?" and he thinks, "Gosh, I gess I aint at that. How much are those lamps there, buddie?" and youv maid a sale.

So it pays to have sum things out by the gas pump and Bob and Spike it going to fix a littel shocase to stand rite there all the time and taik it in nites. So when Ime selling gas Ile get to be a sailsmun, Pete.

Pete, is your boss fussie about hav-ing everything just where it belongs? My boss has got a motto up in the shop and it reeds, "A plase for everything and everything in it" or sumthing like that. I ought to hav copied it down while I was looking at it.

(Concluded on page 52)



There Aint Enny Such Thing as a Glas Bender. What Do You Know About That?

rite along. Then after he was gone I saw Bob scratching his hed and I gesst he was wondering how to get those things sold.

So I sed to Bob, "Why don't you fix a little tabel or shelf or sumthing out there by the gas pump and put sampels of those things on it and a sine on eech one telling fokes 'Howz your lamps? Got an xtra one along?' and 'Woodent a new spark-plug maik her pull better?' and 'Eezy pumping with theez pumps.' Then everybody that cum along for gas coodent help reeding all the cards while they wated and Ide bet they'd buy too."

"Rite out there on the strete?" Bob wanted to kno.

I sad, "Shure, why not? Whats rong about that? Dont you want

# Accounting:

In This Article Shop Practice Is Explained—Starting with the Shop Order in the Office, the System Is Carried Through the Shop Explaining the Shop Tag, Workman's Daily Time Card, Then Through the Office to the Time When Customer Calls for Car—Readers Urged to Offer Criticisms.

By J. Newton Boddy

Mgr. System and Loose-Leaf Dept., Jeffrey & McPherson Co., Minneapolis

In writing an article on shop practice, there are so many items to be taken into consideration that instead of making this a general article, one particular system will be outlined, and it will be followed with another, or several more articles, on the same subject. Other systems will then be outlined and discussed in detail.

The first requisite of any shop system is to provide that all parts, supplies, labor, and a portion of shop expense, are charged against each job going through the shop. As labor is the hardest item to account for, it is very necessary that we have an accurate check on this account. To do this, the mechanic fills out a daily time card, which is turned into the office every evening. This card must show the time of starting and quitting, and give the detail of the mechanic's work for the lapsed time shown. From these daily time tickets the time is posted to and material checked off the shop order in the office.

In addition to these tickets, every job is supplied with a shop tag on which the mechanic registers his time on the job and the parts and materials used. The material used is also reg-

istered on the shop tag by the mechanic or the foreman. Since the material appears on the original job order also, the chances for neglecting to charge material are reduced to a minimum.

EMPLOYEE		RATE	
DAILY TIME CARD 192			
TIME	TIME	WORK DONE	
7:00			
7:15			
7:30			
7:45			
8:00			
8:15			
8:30			
8:45			
9:00			
<hr/>			
5:00			
5:15			
5:30			
5:45			
6:00			
6:15			
6:30			
6:45			
7:00			
		TOTAL DIRECT TIME.....	TOTAL INDIRECT.....

Mechanic's Daily Time Card.

The order of procedure is as follows:

First of all, a shop order is filled out by the proprietor or the shop foreman. On this order is written exactly what the customer orders. If after the car has been in the shop it is discovered that it needs more than the customer ordered, it is always best, if at all possible, to get the customer's O. K. for extra work and parts.

After the shop order has been made out, the shop tag is written up and attached to the car. Detail instructions and the list of parts ordered should appear on the reverse side of the tag. As the work is completed on the car, the items are checked off by the workman completing the job. As parts and materials are taken to the car, they are recorded on the shop tag by the workman getting them from stock.

Referring again to the shop order, it is most important, when any work is undertaken, to see that all parts and supplies for the job are on hand. If any item is out of stock, an order for it should be placed at once, and the purchase order should show the job number for which the parts or supplies are being ordered. Then a memorandum is made of this purchase order on the customer's shop order.

When a job is completed, the shop order must be checked up to see if there are any items on "parts and materials" not checked; if so, why?

The bottom of the shop order is filled in first and then transferred, by totals, to the various columns under "Time used—minutes." A. B. C. D. refer to the class of labor employed on the job—foreman, mechanics, helpers, etc. Four rates of pay will more than cover the average garage. If four rates do not cover your particular shop, it is very easy to have your order printed for five or more.

When the job is finished, extensions are made on the shop order, and from there transferred to the sales ticket, which should show the job number for reference. The shop order may be made in duplicate, the original to serve as the customer's check for delivery of car and the duplicate as the garageman's receipt for proper delivery. The original would be a short sheet extending only to the lines below "Total Time" on order.

Shop Tag	
JOB NUMBER 1234 IN	
WANTED	FINISHED
WORK TO BE DONE	PARTS AND MATERIAL USED
1. ENGINE	
2. ELEC. EQUIP.	
3. REAR AXLE AND TRAN	
4. CLUTCH AND 4 JOINTS	
5. SPRINGS AND FRAME	
6. GENL. OIL	
7. WASH AND POLISH	
8. BODY AND BODIES	
9. STEERING GEAR AND WHEELS	
10. INSPECTION	
SUNDRY	
WORKMAN WILL CHECK	✓ OFF ITEM COMPLETED
PARTS AND SUPPLIES TO BE SUPPLIED NOT LISTED ABOVE	
SUGGESTED REPAIRS NOT ORDERED	

Shop Tag Which Contains Instructions.

THE WEST MOTOR CAR CO.	
CHARGE	PAID PHONE 657—914 KANSAS AVE.
Mr. _____	
Address _____	
SALESMAN	CAR NO.
Gasoline	Oil
Oil	Grease
Articles	
Work on Car	
Labor	
O. K. By _____	
NO REFUND UNLESS SALES SLIP IS RETURNED WITH GOODS	

The Sales Ticket.

In this case, the garageman would never deliver a car, unless to the owner, without a proper receipt, and he would never be criticised for delivering the car to some irresponsible friend or member of the customer's family. As the sales ticket or invoice plays an important part in all garage bookkeeping, we deem it wise to again show a cut of a standard ticket. This makes our chain of procedure complete—shop order, shop tag, workman's daily time card, shop order and sales ticket or invoice.

This system has been found to work out well in the average medium-sized garage. In the small shops it may be advisable to use a shop card with a stub for the customer's receipt. This card, in some cases, combines all three forms shown—shop tag, workman's time ticket and shop order. This method will be taken up in a later article.

Many of the larger shops carry time clocks for registering the mechanic's time, and time used on each job. This system also will be discussed in a later article. Some firms, notably the Ford Motor Co., recommend the use of a standard price for standard repairs and parts. In fact, there are so many good methods of shop practice that it is a pity so many garagemen have no system in their repair departments.

If you have anything special in the way of shop practice or forms, let us hear from you and we will pass the good word along to the rest of the subscribers of the AMERICAN GARAGE & AUTO DEALER. There is nothing in any of the forms suggested in this article, excepting possibly the sales ticket, that may not be procured from your local printer. We hope to hear from some of our subscribers about their ideas of shop practice in time to incorporate the suggestions in the April issue.

#### Wants Accounting System.

We are very much interested in the adoption of an accounting system such as has been outlined in the recent issues of the AMERICAN GARAGE & AUTO DEALER. We have been looking over the \_\_\_\_\_ system, but it seems rather complicated to us.

Your articles interest us very much and we would be glad to learn more about the system described. Can we get it in print and the forms that go with it. If so, where, from whom, and at what price?—P. A. S. Co., S. D.

We are pleased to advise you that Mr. Boddy has made connections which will enable him not only to outline your bookkeeping system, but also to furnish all forms. He is sending you samples of the forms for your consideration. He can also furnish you with any of the standard loose-leaf binders, but recommends from the start a top lock sectional post binder.

If you can give us an outline of

[EDITOR'S NOTE.—Since it is the policy of the AMERICAN GARAGE & AUTO DEALER not to publish any prices, they have purposely been left out. Prices will be gladly furnished on request.]

#### Marked Increase in Car Exports and Truck Shipments.

Net gains of 88½ per cent in car exports and 50 per cent in truck shipments over the year 1918 are revealed

SHOP ORDER										No. 1000		
OWNER					ADDRESS							
CAR					LICENSE NO.							
DATE RECEIVED					FROM							
DATE WANTED					HOUR							
DATE DELIVERED					TO							
WORK WANTED					TIME OVER APPROVED					PARTS AND MATERIAL		
					A	B	C	D				
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
TOTAL TIME												
MEMO—SUPPLIES AND PARTS ORDERED												
EXTRAS—SUGGESTED												
DATE												
A												
B												
C												
D												

The Shop Order on Which is Written Exactly What Customer Orders.

your business, we shall be pleased to suggest for your approval a chart of accounts and a set of forms and bindings to meet your individual requirements.

in the totals for the calendar year 1919, compiled by the National Automobile Chamber of Commerce from statements issued by the Bureau of Foreign and Domestic Commerce.

# "Pre-existing Condition" of Workman

Sanderson Hired an Old Mechanic to Help Out the Boys—One Day He Attempted to Move a Box of Waste, Collapsed, and Died—When Hired There Was No Indication of Serious Physical Condition—Was the Employer Liable?

By Chesla C. Sherlock

One spring day, when the work in the Sanderson garage was getting unusually heavy, due to the annual spring rush, Sanderson hired an old mechanic to help out the boys in the shop.

It was, of course, evident that the old fellow was considerably "slower" than he had formerly been, but there was nothing to indicate that he was in a serious physical condition.

"He will do for light jobs and as a general helper," Sanderson thought, "and when the rush lets up, I'll either find a place for him in the office or else let him go. He's getting too old for hard work."

I need not consume your time nor this valuable print paper to relate all the wearisome details that eventually led up to the point of the old man's breakdown. Suffice it to say, that he attempted to move a box of waste one morning, collapsed, and in a few hours was dead.

Everyone in the shop was thunder-struck. That such a trivial incident as moving a small box of waste paper and floor sweepings, weighing perhaps 40 pounds all told, should cause him to suffer a physical breakdown and die from the effects was inconceivable.

Sanderson worried a great deal about the matter. He was unable to understand what was wrong, and when he came to tell the old widow, he broke down completely, and failed miserably in his effort to make her understand what had happened.

There was one ray of light in the whole disagreeable business, and that was the compensation insurance. Sanderson told the old lady of this and he felt considerably relieved to know that she would be cared for in her declining years, even when the breadwinner had been snatched from her.

With his customary promptness in such matters, Sanderson made out a report of the accident the same afternoon and sent a copy to the State Industrial Commission and to his insurance carrier.

In a few days he received a letter

from the insurance company, which further aroused his determination to get to the bottom of the whole affair and find out just what had happened. The letter read:

"We have your report of the Frisbe case and after a careful examination of the facts as therein set out, we have come to the conclusion that you are not liable for the payment of compensation in this case. This, therefore, relieves us of liability as your insurance carrier.

"It is very plain, from the statement

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## STRIVE.

**"To do the right thing, at the right time, in the right way, to do some things better than they were ever done before; to eliminate errors; to know both sides of the question; to be courteous; to be an example; to work for the love of the work; to anticipate requirements; to develop resources; to recognize no impediments; to master circumstances; to act from reason rather than rule; to be satisfied with nothing short of perfection."**—John G. Shedd.

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of facts as to the manner in which Frisbe received the injury causing his death, that he was suffering a pre-existing condition which rendered him susceptible to violent injury or death at any moment, even from the most trivial cause.

"While it has not been determined in this state whether the pre-existing condition of a workman may be taken into consideration, we feel that the case is sufficiently strong to warrant us in denying liability and running the possibility of suit from the dependent widow."

It did not take Sanderson long to formulate his plan of action. Those of you who have come to know Sanderson, know that his chief concern is always in the welfare of his workers and their dependents. Technicalities of the law did not interest him in the least; all that he knew was that

the insurance company was denying the old widow the wherewithal to put the daily bread in her mouth.

In the course of time, he had persuaded her to fight the insurance company and determine her legal right to the compensation.

"Frisbe was working for me," he said, "when he received the injury that caused his death. He was apparently able-bodied; the fact that he wasn't, can't be taken into consideration at all. He was doing the work of an able-bodied man and was injured in the course of that employment by something arising out of it. If I can read English, that's what the law says is necessary in order to receive compensation."

Blanks were sent for to the State Industrial Commission and they were filled out by Sanderson for the widow, demanding arbitration of the case under the law. The case was set for hearing and a member of the commission came to town to hear the case. The parties all repaired to the court house for that purpose.

The commissioner listened to the story as told by both sides, together with two other arbitrators, one appointed by each of the parties. When the evidence was all in and the parties had summed up their cases, the committee retired to reach a decision.

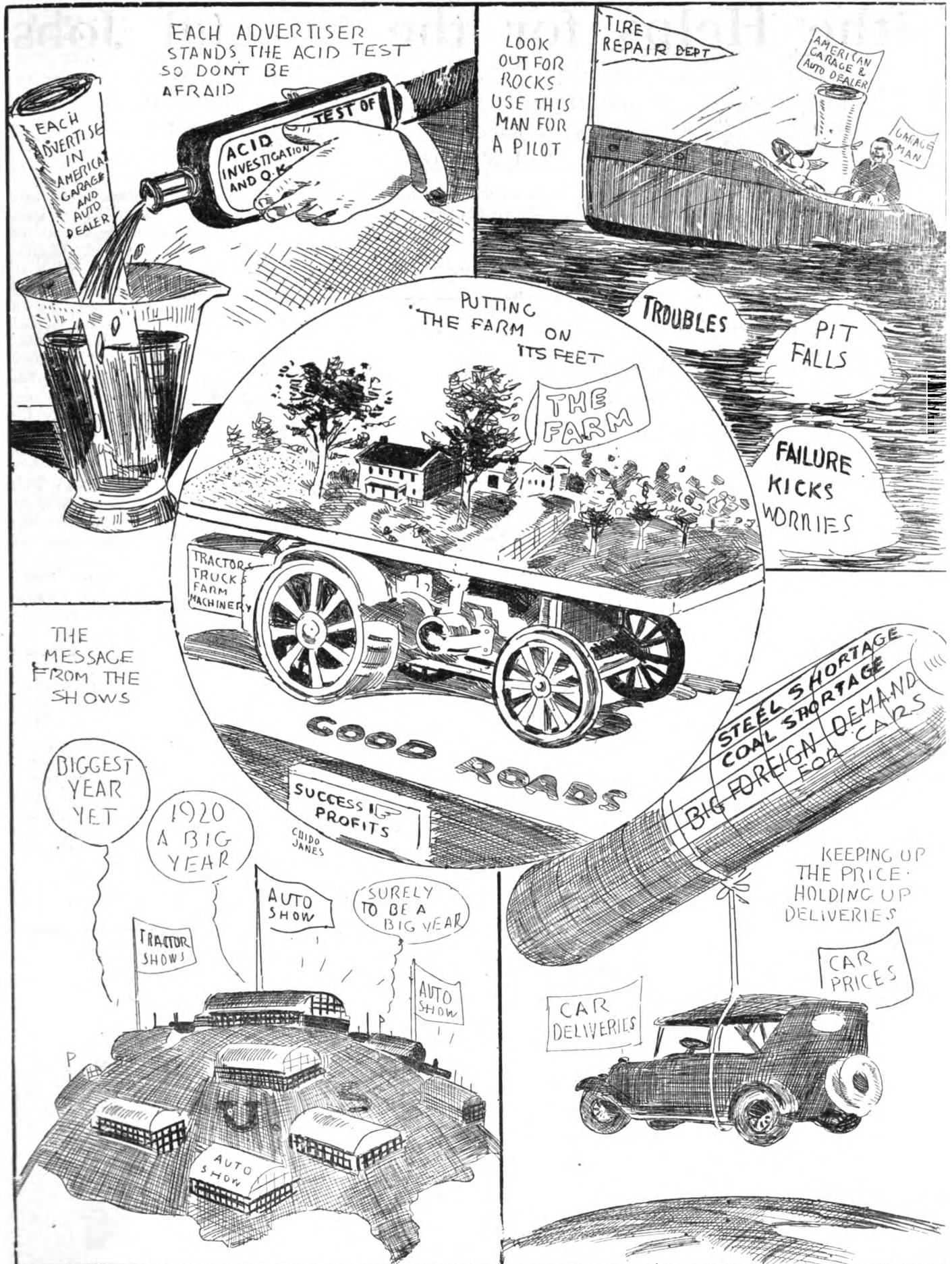
That decision was happily in accord with the general rule in regard to pre-existing condition as it exists everywhere today.

"We are of the opinion," said the commissioner, reading the decision of the arbitration committee, "that Anton Frisbe came to his death while attempting to lift a box of waste matter weighing in the neighborhood of 40 pounds. The strain super-induced heart trouble which caused his death within a few hours.

"It is conceded by the parties that Frisbe's injury arose out of and in the course of the employment, but the point in issue is whether the parties have a right to take into consideration the pre-existing physical condition of

(Concluded on page 52)





Things of Current Interest to the Garageman as Seen by the Cartoonist.

# Lathe Helps for the Special Jobs

The Great Variety of Work That the Lathe Can Do Calls from Time to Time for Special Holding Devices—Some of the Common Methods Employed on Irregular and Special Jobs Enumerated—How to Select a Lathe

By J. N. Bagley

We may justly say that the lathe is the most important of all the metal cutting tools in use at the present time. There are other valuable tools, we must admit, but they do not cover the range of work that the lathe does. The lathe is very rapid in its execution, which, of course, is due to its continuous cutting ability. Many tools cut only intermittently, therefore, it is safe to say without fear of contradiction, that the lathe will perform a greater variety of duties than any other tool on the market today.

We might enumerate some of its uses as: Turning, boring, drilling, reaming, cutting keyways, and milling keyways for Whitney keys. For the latter it will be necessary to have an attachment known as a "milling attachment," but it can be considered a part of the lathe, because it can be obtained as regular equipment.

Work-holding devices are very necessary in connection with the lathe and some sort of a device can be arranged for every job to be done on the lathe. It is impossible

to mention all the different devices that can be made for holding regular and special jobs, as this would fill a book of immense size,

The purpose of this article is to explain

be readily seen has nothing to do with our present modern machine, but is mentioned only to acquaint the reader with the term "lathe" from its inception. The lathe operators in those days, housed in on all

sides with hills, did not make Ford axles, cap screws with threads, etc., but they did make the lathe that has been gradually developed into the modern machine you have in your shop today.

The various forms in which the lathe appears in the ordinary garage or machine shop are:

The "foot lathe," signifying a lathe that is driven by foot power by means of a treadle device.

The "hand lathe,"

denoting that the tools used for cutting must be held in the hand and supported by some sort of a tool rest. This type of tool could be either foot or power-driven.

Then we have what is termed the "single-gear lathe," signifying it has no gears to increase or reduce the speed of the live spindle from that of the pulley cone; and finally the "back-gear lathe," which has gear wheels to reduce the speed of the lathe live spindle without altering or changing the speed of the driving belt.

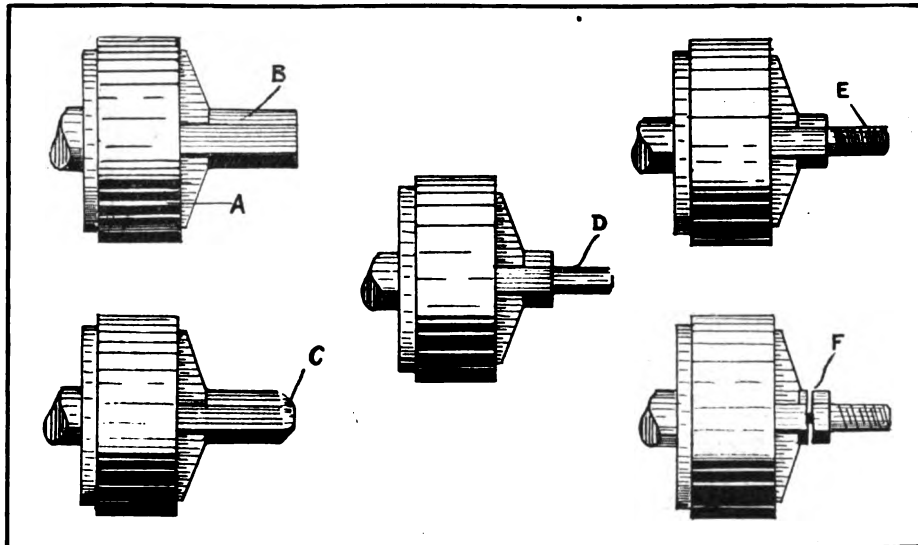


Fig. 1—The Various Steps Employed in Turning a Cap Screw in a Lathe.

some of the common methods of holding work in the lathe. If a man is mechanically inclined, after he has mastered the fundamental principles of lathe operation, he will be able to devise ways and means of handling all out-of-the-ordinary jobs without any trouble whatsoever. Lathe principles are the same whether the lathe be large or small, new or old.

History takes us back to the remnants of the old Asiatic nation settled in the remotest parts of Galicia of the Carpathian mountains, where lathes were used for turning wood. They roughed out a stick with an axe or hatchet and suspended it between centers. Around one end of the stick to be turned, they would make a couple of wraps of rope, fastening the upper end to a limber sapling and the lower to a treadle device.

When the pressure was applied to the treadle, the stick would turn and a cut would be taken. The cutting tool would then be drawn away and the sapling would spring back, revolving the stick backwards and at the same time drawing the foot treadle into position for the second cut. In some instances, the work to be turned was suspended between centers held between two trees, while later a sort of frame was made to answer the purpose of a stand.

No cutting could be done while the work was being rotated backwards. This it will

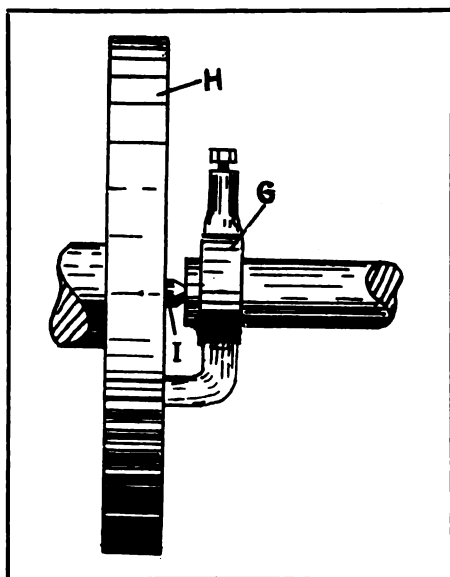


Fig. 2—Using the Lathe-Dog.

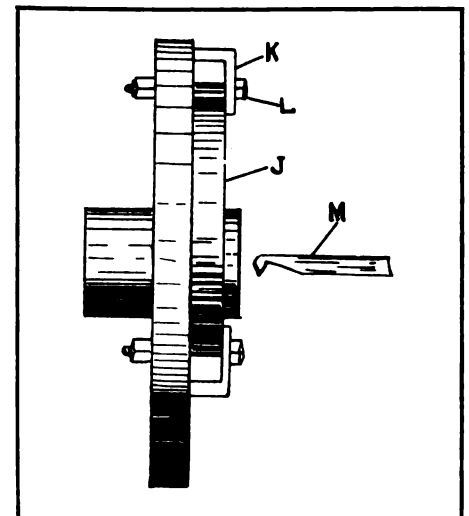


Fig. 3—A Job That Cannot Be Chucked.

The "screw-cutting lathe" is provided with a lead screw running along the lathe bed and driven by gears from the spindle shaft, which can be made to move the

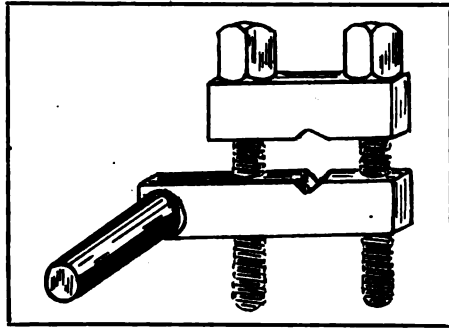


Fig. 4—Common Form of Lathe-Dog.

cutting tool to make the cut. The screw-cutting lathe, with independent feed, has two separate and distinct feed screws; that is, one for cutting threads and the other for ordinary turning. The object of having the feed for ordinary turning is always to have the other in good condition for thread-cutting. This type of lathe is a trifle more expensive than the single, screw-cutting lathe, but it is much more satisfactory, because more accurate thread cutting can be done.

Then we have what is known as the "chucking lathe." This lathe has a large face-plate and a short bed and is adapted mainly to handling such work as has to be held by chucking. By "chucking" is meant that the work is held without the aid of the lathe centers.

There are many other styles of lathes than those mentioned, such as boring lathes, turret lathes, grinding lathes, etc., but at this time we will consider such types of lathes as are used for general repair work and manufacturing such parts

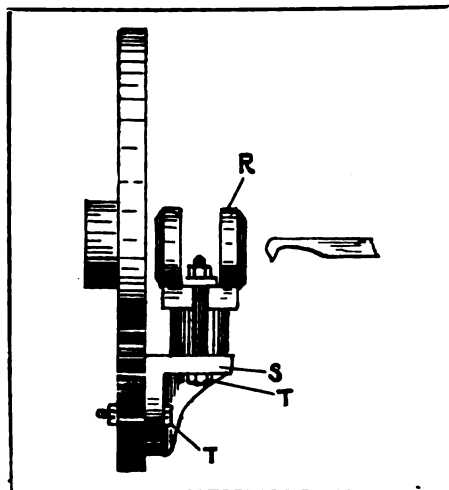


Fig. 5—Fastening Work to Face-Plate.

as can be made by the every-day mechanic found in the garage.

The screw-cutting engine lathe comes regularly equipped with all gears, face-plate, wrenches, etc. For general repair work, a couple of chucks will be found necessary—one three-jaw universal and one four-jaw independent. The universal will be self-centering and valuable for holding short rods for making screws, pins, etc., while the four-jaw independent will be found invaluable for holding irregular work for facing, turning, etc.

We will now take up the making of cap screws by holding the rod in the three-jaw, self-centering chuck. At *A*, in Fig. 1, we have the chuck and at *B*, the piece of octagon steel in position for the first operation for making the cap screw. At *C*, we have rounded the end of the stock with the cutting tool ready to cut it to size. At *D*, we have turned the rod down to the proper size for cutting the thread.

The thread can now be cut on the lathe,

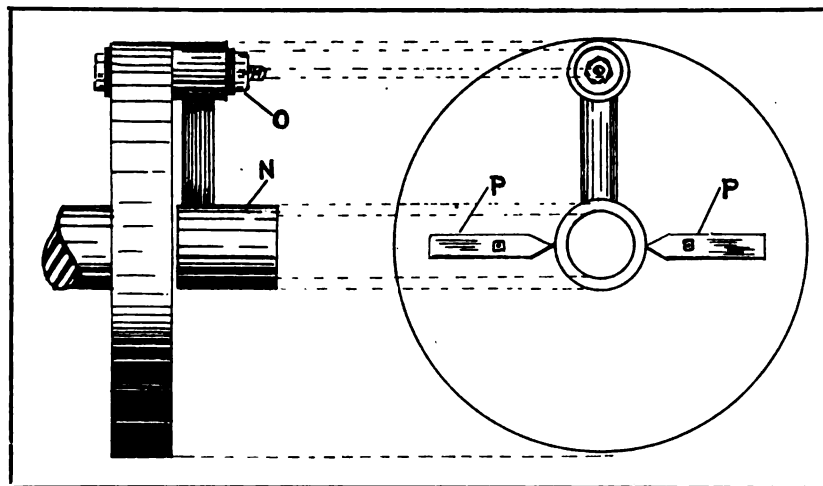


Fig. 6—A Boring Job That Requires a Special Fastening.

or it can be removed and placed in the vise and cut with the die; it does not matter which method is employed. At *E* is shown the stock threaded and back in the chuck ready for the next operation, which will be to cut off the cap screw. At *F*, we have the screw nearly cut off with the cutting-off tool, or this can be cut with the hacksaw, in case the suitable tool is not handy.

Now that the screw is cut off, it will be necessary to round up the head. To do this, open the chuck jaws and remove the stock. Place the threaded end of the screw in the chuck so as to leave the head out; it can then be squared up in a few seconds.

In case the stock is small, the lathe can be speeded up and the cuttings taken very rapidly. Care should be taken in setting the cutting tool, so as to have the cut come clean and curled from the stock. If the tool is set too high, the "rake" of the tool will crowd the work to one side and will not cut, but instead will bend or break the stock. In case the tool is set too low, the cutting edge will gouge under

the work and either bend the stock or break the tool. Experience is the best teacher in setting the tool for the work.

In case the shaft that is to be turned is

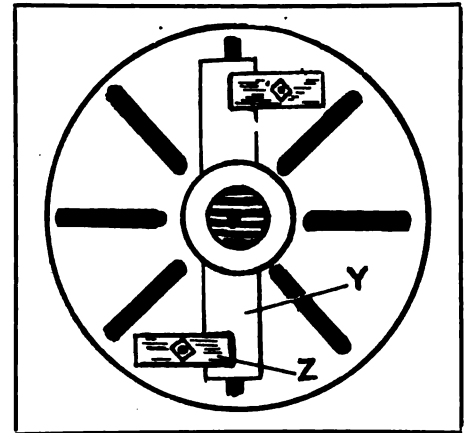


Fig. 7—Another Way of Holding Job.

so long that it cannot be held in the chuck, it must be held between the centers and driven with the lathe-dog, as shown at *G*, in Fig. 2. The dog is held securely to the shaft to be driven by a set screw and the bent end inserted into the slot in the face-plate, *H*. The work should be just tight enough between the centers at *I* that it will not chatter or rattle.

At *J*, in Fig. 3, is shown a boring job that cannot be chucked. Therefore, it will be necessary to hold it to the face-plate, while the boring tool, *M*, is fed to the work. Two or more clamps, *K*, held to the

plate by the aid of bolts, *L*, passing through the plate will hold the work very nicely.

In Fig. 4 is illustrated a very common form of adjustable lathe-dog for use in connection with the face-plate for holding

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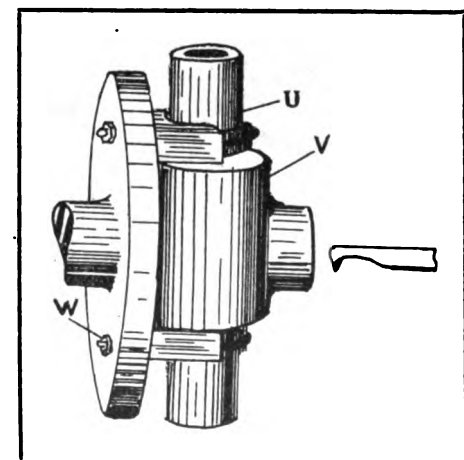


Fig. 8—Unusual Fastening of Work-Piece.

# Practical Hints for Shop Mechanics

Conducted by E. C. Pohlmann

## Adjusting Brakes.

A quick and simple way of adjusting foot brakes and reverse bands on Ford cars, especially when a ratchet wrench is not available, is to compress the spring on cross bolt with screw driver or a tire tool, using the side of the transmission cover as a fulcrum, and then turn nut with the fingers, or wrench.—R. C. S., Tenn.

\* \* \*

## Ford Cranking.

Many find a Ford very hard to crank, even after giving the clutch proper release. Careful examination when the clutch housing is taken apart will show that a part of the disks have notches or burrs which make the motor hard to turn over. Trimming the faces of these disks with a file before putting the clutch back into place will usually eliminate this trouble.—F. H. R., Mont.

\* \* \*

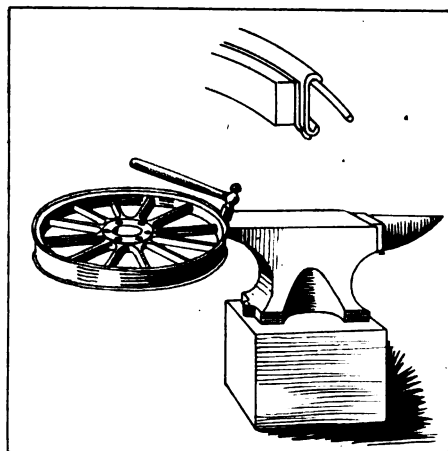
## Replacing Bearing Caps.

If the pistons and the connecting rods are to be withdrawn from an engine, much of the time which is spent in shim-fitting may be saved if the bearing caps with their respective shims are replaced on the rod after removal. One movement of the mechanic may otherwise throw all bearing caps and shims in a heap and give him extra work to do. Experience has taught this one.—V. W. C., Ill.

\* \* \*

## Straightening Clincher Rims.

You can save your customers the price of a new wheel which has been deformed,



Method of Strengthening Rims.

due to running on the rim, by employing the following method:

Take a piece of round iron about the right size to fit in the edge of the rim and bend it slightly to fit the curve. Then

## ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

place it in the rim and put the rim or wheel on the anvil as shown by the accompanying illustration, and hammer the edge until the rim is straightened. A piece of  $\frac{3}{8}$ -inch round iron is just right for a Ford front wheel.—R. W. I., Kan.

\* \* \*

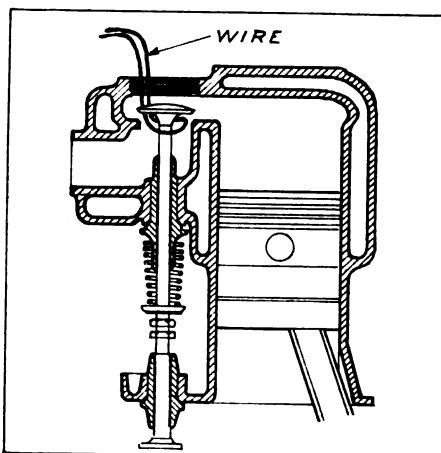
## Keyway Repair.

When a keyway becomes worn, the first thought of the owner is to file the channel and fit a key. A better way is to weld new metal into the old slot and then cut a new keyway to fit the old key.—F. B.,

\* \* \*

## Removing Valves.

An easy way to remove valves on cars where the ports are so small that it is difficult to pick them out with the fingers is to first take the pins out and then turn



One Way of Removing Valves.

over the motor until the valve is open.

While the motor is in this position, slip a loop of fine wire through the port hole and under the valve head and then lift it out.—G. E. H., Mass.

## Holding Differential Case.

The following is a very practical and efficient way of holding the left half of a Ford differential case while tightening ring-gear screws.

Bore three  $\frac{7}{16}$ -inch holes clear through the bench top so that the three differential studs will go through.

After placing ring gear in case, invert it and let the studs fit in the holes and you have the best device for this kind of work.—T. J. D., Va.

\* \* \*

## Cleaning Stud Holes.

In cleaning carbon from a Ford motor, small particles of it drop into the stud holes and make the studs very hard to turn down.

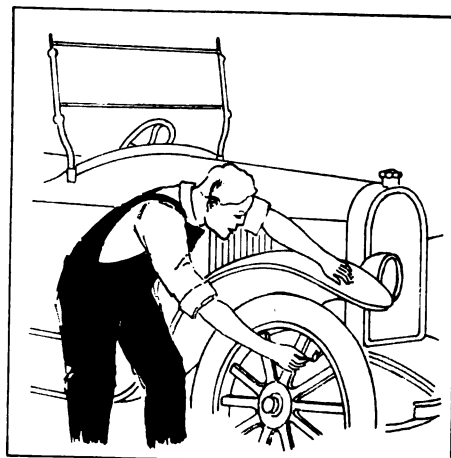
If you will take an ordinary tire pump and blow out the small particles of carbon, the studs will turn down very easily and you won't be liable to turn them off, as sometimes happens.—S. M. C., N. C.

\* \* \*

## Removing Valve Core.

Every tire man finds it a hard job to remove the valve core when it sticks. When one sticks, it means that the tire-man must take the tire and rim off the wheel and the tube out of the tire and then remove the valve stem, and finally put in a new stem.

When the valve core sticks, use three or four matches and heat the stem, and it will be found that the core will come out very easily. The little rubber that is around the core becomes stuck to the walls of the valve stem and is made so tight that, when you try to force the screw part out, it pulls



Heating Stem to Remove Valve Core.

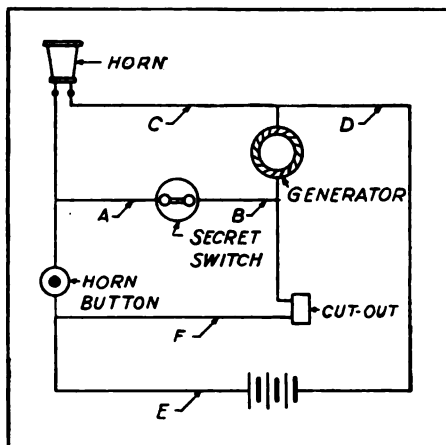
apart, and that means a new valve stem. But when it does pull apart, just heat it and use a small pair of pliers, and you will find that the core will come out easily.—A. W. B., Neb.



### Car-Thief Alarm.

I have struck an idea that has proved successful as a car-thief alarm and I am passing it along for what it is worth.

If a car is equipped with a generator



An Ingenious Thief Alarm.

and electric horn, make the following connections and check up with the diagram:

Connect a wire, *A*, from the one that leads from the button to the horn to a switch in some secret place. Run the other wire, *B*, from the secret switch to the wire from the generator to the cut-out relay. Then connect the wire, *C*, from the horn to the battery to the wire, *D*, from the generator to the battery, and the wire, *E*, from the battery to the horn button should be connected to the wire, *F*, from the battery to the cut-out relay.

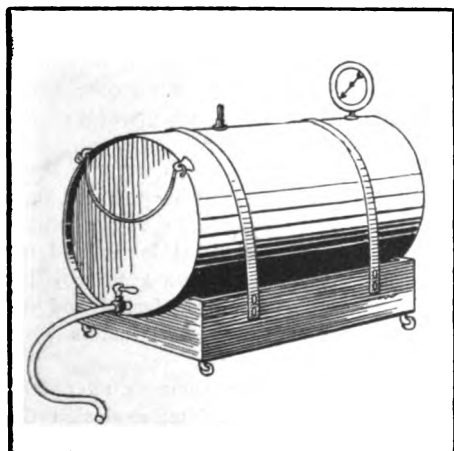
It is seen from the diagram that when the engine starts the horn will also.—W. H. R., Ohio.

\* \* \*

### Portable Grease Container.

A very handy portable grease container can be made from a half-barrel steel drum as follows:

Take any old half-barrel steel drum that



A Handy Grease Container for the Shop.

you happen to have around the shop and drill a hole in the side of it as shown in the illustration and insert an inner-tube stem. On the same side and near the edge of the barrel, install an air gage. In

the top end of the barrel fit the nozzle to which you can fasten an old piece of hose or rubber tubing. On the same end fasten a bucket handle as shown in the illustration.

Then take a box from an old toy wagon and fit it with casters. The ends of the box should be carved out to fit the barrel as shown in the illustration. The barrel should be securely fastened to the box by means of a leather belt or metal strips.

We are using this outfit in our shop every day and find it very handy for filling differentials with grease. It saves considerable time and does away with the nuisance of getting grease all over one's clothes.—O. W. L., Ill.

\* \* \*

### Chain Tool.

To remove or replace the lock link of motor chains is not as easy a task as would be presumed. This operation can be facilitated to a great extent by the use of a tool that will hold the chain together while doing the work.

This tool should comprise two steel hooks that may be caught into the links, one on each side of the lock link, and so shaped that a long bolt can be run through and hold together these hooks so that they can be contracted by turning a thumbscrew. In order to insure durability, the steel jaws should, of course, be case-hardened.—C. S., Ill.

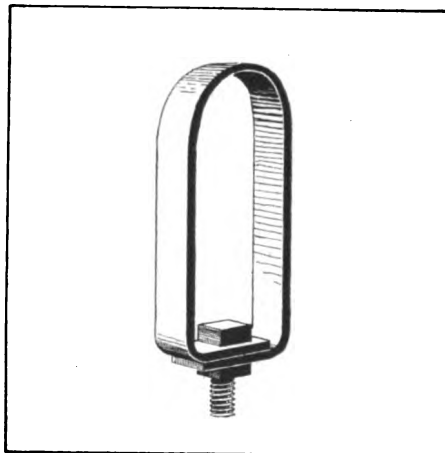
\* \* \*

### Motor Hoist Hook.

In the accompanying illustration is shown a Ford motor hoist hook. This hoist hook is made from a piece of strap iron one inch wide,  $\frac{1}{4}$  inch thick and 16 inches long. A  $\frac{7}{16}$ -inch hole is drilled in each end.

Then bend it into a horseshoe shape and bring the holes together at the bottom as shown and put a  $\frac{7}{16}$ -inch bolt from the inside and fasten the ends together.

After removing the cylinder head, screw

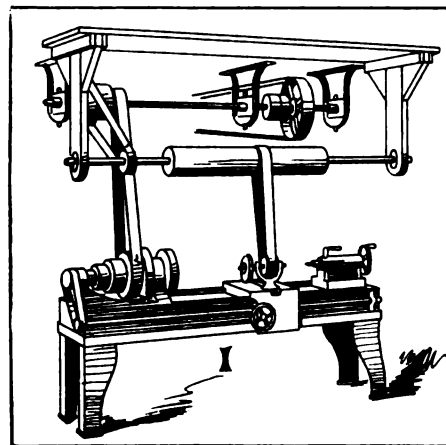


Simple Motor Hoist Hook.

this bolt into one of the holes, preferably the second last center hole which will make the motor balance. The hook from most any hoist will fit in the upper end if it is left wide enough.—A. C. S., Minn.

### Lathe Grinder.

The lathe grinder shown in the accompanying sketch is better than any we have ever seen or tried out and we have tried out a great many. It is very simple.



A Simple Lathe-Grinding Attachment.

We have an ordinary friction clutch, forward and reverse belt-shift, countershaft lathe. We made two additional wood hangers, but much larger, and hung between them, beneath the regular countershaft drive, another shaft on which we fastened a belt pulley and a long drum or pulley.

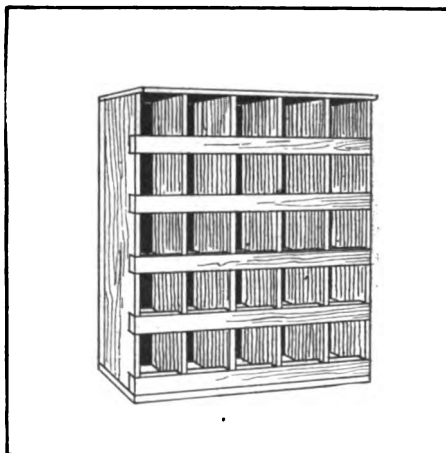
It is seen that when the grinder is moved forward or backward, the belt moves with it. And if it is worked from the back side of the work, the lathe spindle and grinder run in opposite directions.

This tool is our own get-up or idea, and it certainly does fine work and is a big time saver.—E. G. B., N. Y.

\* \* \*

### A Bolt Cabinet.

A simple and very convenient bolt cabinet can be made as shown in the accompanying illustration. The lumber can be  $\frac{1}{2}$  inch thick or of any other thickness to suit the requirements of the builder.



A Convenient Bolt Cabinet.

The bins should be 4 ins. by 4 ins. by 4 ins., with  $1\frac{1}{2}$ -inch piece in front to hold the bolts. Labels can be fastened to the front, to show the size of the different bolts.—D. F. B., N. J.

# Adjusting the Tractor Carbureter

Successful Operation of the Tractor Depends on Correct Carburetion—Tinkering Should Be Tabooed—Why Water Is Used in Connection with Kerosene—Method of Adjusting Kerosene Carbureters—Purpose of the Air Cleaner

By E. C. Pohlmann

When it comes to the actual, practical part of adjusting carbureters, very few repairmen use their heads enough to produce the right mixture. Invariably when the tractor or automobile refuses to start, misfires, lacks power, or fails to do the thousand-and-one things it is supposed to do, the repairman will instinctively fool around with the carbureter adjustment screws—a poor way of compensating what is usually an entirely foreign trouble.

A carbureter is a device used for mixing gasoline, kerosene, distillate, naphtha or alcohol with air, and carburetion is the process of mixing them. To obtain the maximum of power in the cylinders, the mixture must be in the right proportion of gasoline, or kerosene vapor and air.

Pure gasoline or kerosene vapor will not burn—it must be mixed with air before it can be used in an engine. To burn with the greatest rapidity and heat, the air must be in the correct proportion to the vapor. An excess of air produces a weak mixture and results in difficult starting, misfiring and a loss of power. An excess of gasoline or kerosene produces a rich mixture and results in overheating, poor economy and a loss of power.

The successful operation of an internal combustion engine depends primarily on the proper adjustment of the carbureter. Consequently, when adjusting the carbureter the engine should be operating under normal conditions, and preferably with the spark-plugs clean. After that, any difficulty in starting, misfiring or lack of power, will be the cause of circumstances entirely foreign to the carbureter, such as a cold engine, weak spark, dirty plugs, etc., and not the fault of the carbureter adjustment.

Right here too much emphasis cannot be placed on the condemnation of mechanics who will try to compensate entirely foreign troubles by adjusting the carbureter. If the engine fails to start, don't continually flood the carbureter or prime the engine. If the engine misfires or lacks power, be sure that everything else is in good working condition before you attempt to compensate the trouble by adjusting the carbureter.

The carbureter should always be the last thing to touch. Any change in the adjustment from what supposedly is normal means decreased efficiency, higher fuel consumption, greater carbon deposit, quicker oil deterioration, lubrication trouble and wear.

Nearly all tractors start on gasoline, and after being warmed up, operate on kerosene. In connection with the carbureter, every engine is equipped with some device for water injection. Many repairmen do not understand why water injection is necessary and what its purpose is and for that reason a few words of explanation will not be out of the way.

Kerosene always produces greater heating of the engine and, moreover, kerosene vapor-air mixture ignites at a lower temperature than gasoline vapor-air mixture. For gasoline, the ignition temperature is 680° Fahrenheit and only 575° Fahrenheit for kerosene. Of course, these tempera-

its latent heat—that is, to change the water to steam—and the charge, therefore, will not attain the same temperature at the end of compression as it would if no water were present and pre-ignition (the cause of knocking) is prevented.

Knocking in an automobile engine does not occur if the cylinders are free from carbon, because the compression ratio is correct for the ignition temperature of the fuel used. When the cylinders become carbonized, the compression ratio is increased and hence pre-ignition takes place. If water is injected, the ignition temperature is lowered, knocking does not occur and the engine operates smoother.

Tests show increased fuel economy and smoother operation when water is injected with the charge and writers have been at a loss to explain this phenomenon.

Water cannot furnish directly any mechanical energy to the engine, because it is found in the gaseous state in the exhaust and in a finely-divided state of water in the charge, and, therefore, has a greater amount of potential energy when leaving the engine than when entering it.

Therefore, the effect of water can only be indirect and through its effect on the thermal efficiency of the engine. The amount of heat given up to the cooling water is greatest during the first part of the power stroke when the temperature is highest. It reaches a minimum towards the center of the stroke and again is of considerable value toward the end of the stroke as the wall area becomes a maximum.

The piston speed becomes a maximum just before the middle of the stroke, while the pressure and power are greatest at the beginning of the stroke.

It is seen that if we can transfer some of the heat liberated during the first part of the stroke, to the middle of the stroke, we will reduce the jacket losses and increase the thermal efficiency, thereby increasing the power transferred and increasing the economy. And that is what water injection does.

During compression some or all of the water is vaporized, and on explosion the remainder, if any, is converted into steam and then all of it is superheated under high pressure. It, therefore, absorbs energy of combustion during the first part of the stroke and gives it out later in the stroke.

The carbureters on most of the tractors are either of the dual or double-bowl type

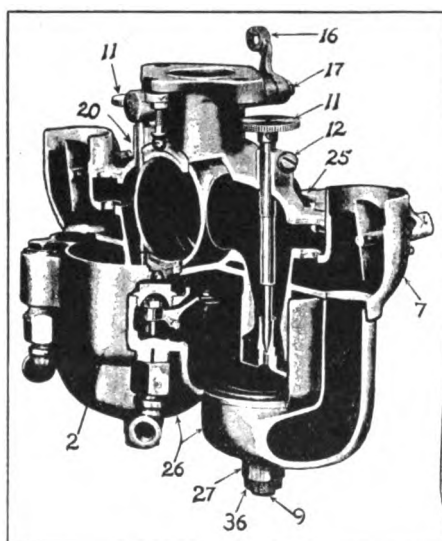


Fig. 1—The Dual-Type Carbureter.

tures will vary for different fuels, but on the average they are representative values.

Because of the difference in ignition temperatures, the compression ratios used in gasoline engines would invariably lead to pre-ignition in kerosene engines. Therefore, kerosene engines must be designed with a smaller compression ratio, or the temperature of the charge just before ignition must be kept down by water injection.

Decreasing the compression ratio means decreasing the thermal efficiency. Consequently, manufacturers of kerosene engines resort to water injection to keep down the temperature of ignition.

Water enters in a liquid state, very finely divided or in the form of a very fine spray (as in the case of the Rumely tractor). During compression, it absorbs some of the heat which is generated by the compression of the charge, to make up



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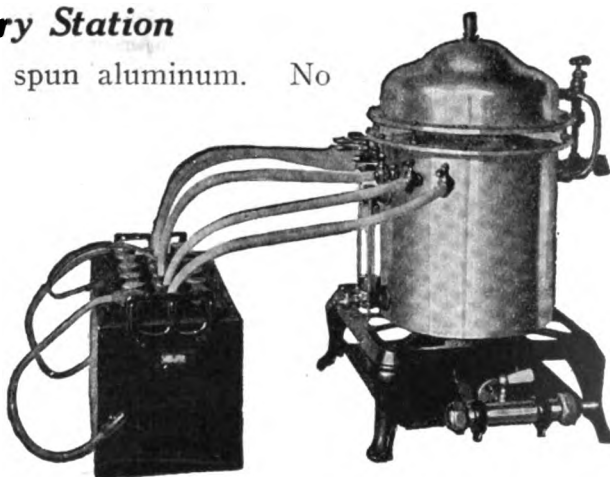
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or else the single-bowl type. The Kingston dual carbureter employs two bowls, one for gasolene and the other for kerosene. Gasolene is used in starting the motor and running it until the motor warms up. Then it is switched to kerosene by

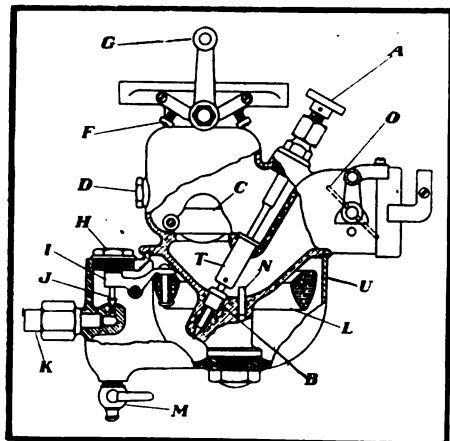


Fig. 2—The Single-Bowl Carbureter.

turning the three-way valve, not clearly shown in Fig. 1. The fuel supply is controlled by the needle valves 11.

To adjust the needle valves correctly run the motor to speed, set the spark in the retarded position and proceed as follows:

Loosen screw 12, and turn needle valve slowly to the right until the motor starts to backfire through carbureter. Now slowly turn the needle valve to the left until the motor picks up maximum speed. After the motor warms up and the proper adjustment has been made, the exhaust should be clear. Too much fuel produces black smoke.

When the motor is operating right, tighten the notch screw 12. The needle valve is the only adjustment on this carbureter. The auxiliary air is controlled automatically by the ball valves, 25. This takes care of the mixture at all speeds above and below normal, so that after the adjustment is once made on the needle valve, no further adjustments are required.

The Kingston single-bowl carbureter is

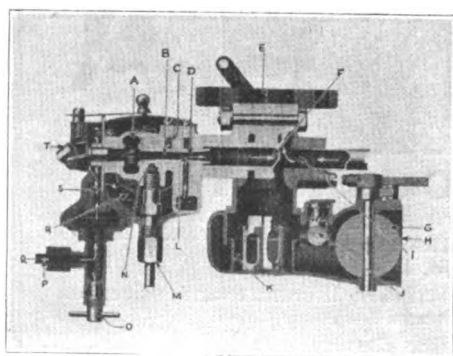


Fig. 3—The Holley, All-Fuel Carbureter.

shown in Fig. 2. To adjust, retard spark fully, open throttle about five or six notches on quadrant and loosen needle valve binder nut on carbureter. Turn nee-

dle valve A until it seats lightly. Do not force. Adjust away from seat one and one-half turns.

Run engine until it warms up, close throttle and by means of the adjusting stop screw F, in throttle lever G, obtain the desired idling speed. Now adjust valve A towards seat until engine loses speed, then adjust needle valve away from seat or turn to left very slowly until motor attains its best and maximum speed. With this adjustment completed tighten binder nut.

The Holley all-fuel carbureter is shown in Fig. 3. Changing the position of pointer on the atomizer D to the different positions on the dial varies the amount of fuel being meter into the vapor tube at L. The position marked "start" gives the richest mixture, position 1 slightly less and so on to position 4, which gives the leanest mixture. The atomizer can be cleaned by removing cotter pin at T on adjustment rod, and pulling out atomizer which is held in place by a compression spring and bolt at C.

The Secor-Higgins carbureter used on the Rumely oil-pull tractor, shown in Fig. 4, has three boxlike compartments surrounding a central intake tube. There is a compartment for kerosene, one for gasolene, and one for water. All adjustments necessary are made by means of the small hand wheels on each needle valve as shown. The top of the carbureter should be removed to clean screen from scale, rust, paraffin or asphaltum.

When only one bowl carbureter is used for both gasolene and kerosene only one adjustment is required; that is, the adjustment of the fuel needle valve. This adjustment should be such as to give the best power without any smoke.

Except in cold weather, the adjustment for kerosene will do for starting on gasolene and no attention is required after the carbureter is once adjusted.

The purpose of the air cleaner is to keep dirt out of the engine. In using the tractor in the fields, considerable dust is raised, and if this were taken into the cylinders it would cause more or less wear on the piston rings, valves, bearings, etc., and would result in loss of power and necessitate frequent repairs.

The Bennett air cleaner, which is used on most tractors and shown in Fig. 5, is based on the principles of centrifugal force and the force of gravity. The action and construction can be clearly understood by reference to the illustration.

The air is drawn in by the suction of the engine through the openings B in the side of the cleaner. It then passes through the spiral tubes E. These tubes are so constructed that the centrifugal force which they impart to the current of air and the action of gravity throw the dust into the trap C, as the air changes direction and slows up in passing towards the opening A

and into the carbureter. The cone seen in the center of the air cleaner is nothing but a baffle to prevent the current of air from carrying the dust from the trap.

The mason jar D should never be removed while the engine is in operation,

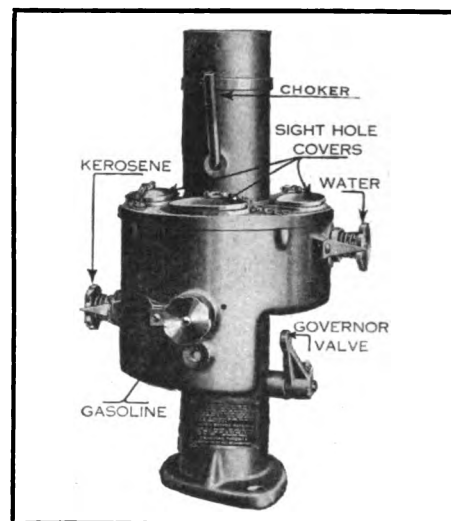


Fig. 4—The Secor-Higgins Carbureter.

and care should be taken not to loosen it, as this would destroy the function of the air-cleaner and affect the operation of the engine.

### Stale Gasolene.

After it has stood for several days, even in a tight tank, gasolene will become dead and slow to ignite. This is partly due to evaporation and partly to the chemical changes that take place in the liquid.

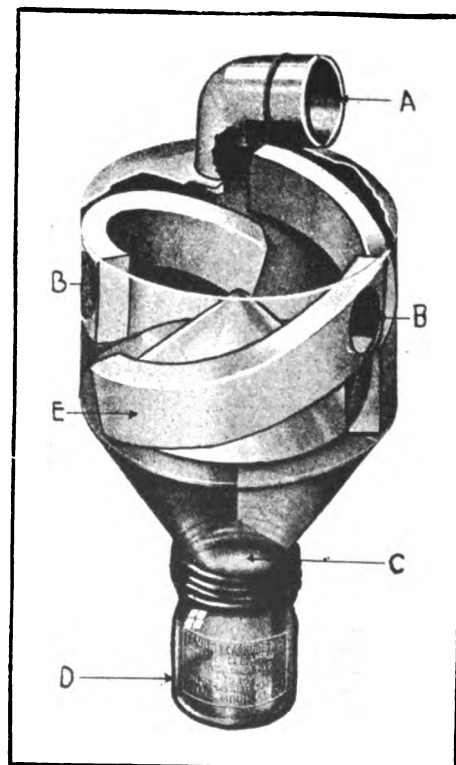


Fig. 5—Usual Type of Air Cleaner.



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# Welding, Cutting and Brazing Practice

In This Article the Method of Successfully Welding Automobile Springs Is Explained—Detailed Instructions Are Given in a Clear and Simple Manner—Even a Beginner Should Have Little or No Trouble Doing This Work

By David Baxter

One phase of oxy-acetylene welding concerning which there is considerable argument is whether or not spring welding with the torch can be successfully accomplished. No doubt, there is much poor work being done; some supposed authorities even claim it is useless for the torch-welder to accept jobs of welding automobile and truck springs unless he is particularly expert, or has had lots of experience.

But I think this is a little far-fetched, for the process of welding springs as described in this article seems to be quite simple. The average welder should have no trouble in making satisfactory spring welds, if he will temper the instructions with common sense. What is meant is that shop conditions and equipment, together with a possible difference in the metal of the springs, must be taken into consideration.

A variation in the temperament of different welders also affects the following out of any rules or instructions; a man often thinks he is following implicitly, when in reality he is doing almost the opposite. It is so easy to misunderstand. For this reason it has heretofore been found better to give the instructions in the "has-been-done" or "can be done" manner instead of trying to project hard and fast rules for doing a certain thing. Usually it is best to tell how a job was done in a certain way, then the welder who attempts to do a like job has the privilege of making such little changes in the procedure as his experience dictates.

This time, however, an attempt will be made to tell how to weld automobile and truck springs, with the assurance that at least three welders are doing it that way with good success. Of course, there are several shapes and styles of automobile springs, but generally speaking, the welding will be the same for all classes. That is, the fundamentals will be the same—the regulation and manipulation of the torch; the kind and application of the filler metal; the preparation for, and completion of, the welding, etc. These things and other minor details will be practically the same for all styles of springs.

Perhaps, it should be stated here, that this article refers only to the flat or leaf type of spring, although the instructions will no doubt apply to coil springs or other special shapes. The principles of welding should hold good on springs of all classes. The individual welder may do a little experimenting along this line, but at

this time the flat styles only will be dealt with.

A variation in the quality of different springs that come to the welding shop may be present, but this should not interfere with the welding, except in extreme cases. That is, there may be a difference in the composition of the steel in some springs, but this only necessitates a little different treatment with regard to the handling of the welding flame and filler rod, or to be a trifle more careful with the welding.

But to proceed with the instructions for welding broken automobile or truck springs, let us take, for example, the outer

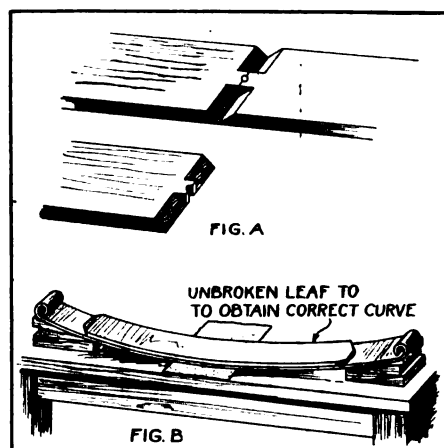


Fig. 1—Details of V-Grooves and Aligning the Broken Leaf.

leaf of a common spring. Suppose it is broken through the bolt hole in the center of the leaf, and suppose it is about a quarter of an inch thick in the break.

The first thing to do is to prepare the fracture for welding by grooving it about the same as for welding a casting. In other words, both sides of the break are beveled so that when fitted together the two bevels will form a wide V-shaped groove.

This groove should be correctly proportioned to insure a strong weld. If it is too wide, it affords too much chance for burning the metal while filling it. If it is too narrow, it is difficult to weld to the full depth, which results in a poorly connected bond. By experiment, it will be found that a simple way to get a correctly-proportioned groove is to bevel back each side of the break a distance equal to the thickness of the metal through which the break passes. In other words, if the spring leaf is a quarter of an inch thick, the bevel should be cut back a quarter of an inch.

This will make the groove half an inch wide at the top when the two bevels are

fitted together. This rule is correct enough for practical purposes, since it may be varied slightly either way with no material difference in the strength of the finished weld.

Now that we have the width and depth of the groove, let us see about the length of it. If the fracture occurs where there is no bolt hole, the length of the groove should be the width of the leaf.

With the spring to be welded, however, there is a bolt hole in the center of the break so some special grooving must be done in order to save the hole. When doing the beveling, then, we must be careful not to cut through to the hole, but leave a thin sloping wall at the end of the groove next to the hole. This wall is easily fused by the welding flame as each side of the weld is made. When the beveling is complete, we have two grooves instead of one—one on each side of the bolt hole.

Some welders think it better to bevel out the width of the leaf and drill a new hole after the weld is finished, especially if the hole is badly worn. It is not advisable, however, to destroy the hole, if it can be saved, because there may be a little hard spot in the weld right where the hole is to be redrilled.

All breaks should be grooved, even though they occur in a thin part of the leaf, and particularly in very heavy springs. This is accomplished the easiest perhaps by grinding on an emery wheel; the ground edge should be almost sharp where it meets at the bottom of the groove.

Now a point that must not be overlooked in the matter of grooving spring fractures is the location of the groove. It should always be located on the inner or concave side of the spring. This lessens the strain, due to the pull being against the wide part of the weld instead of the narrow part when the load rests upon the spring.

The foregoing instructions concerning the beveling of broken spring leaves are illustrated in Fig. 1-A.

When the grooving process is complete, the next thing to do is to align the spring for welding. This is accomplished as shown in Fig. 1-B in a simple way. The beveled ends of the broken leaf are placed to the welding-table or a leveling-plate; the two outer ends are wedged up until the leaf has the proper curve, which is easily ascertained by fitting an unbroken leaf to the inner side of the curve and wedging

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the broken parts up to it. After the broken leaf is properly aligned, the whole leaf is removed.

Wedging-up is done with blocks of iron, flat pieces of steel, wooden wedges, or anything that comes handy, so the arrangement will not slip or fall down at a critical part of the welding process. It is not necessary to clamp the broken parts in position. In fact, it is better to allow them to be free in order that expansion and contraction may have full play, except that no sagging, which is likely to happen when the welded portion gets red hot, should be permitted. The springs should be welded completely in the aligning position.

When aligning the broken parts, it is a good idea to place a double thickness of asbestos paper directly beneath the groove. This mat of asbestos paper may be anywhere from three to six inches square. The V-groove should be placed over the approximate center of it. The asbestos acts as a heat reflector which throws the heat of the torch and weld back, thus concentrating it on the melting groove.

This concentrated heat helps to make the welding more rapid without so much intensity on the part of the welding flame, thus saving gas and lessening the danger of burning the spring and filler metal. If the heat reflector is operating properly, it is not necessary to hold the welding flame very close to the weld; a milder flame may be utilized.

The asbestos paper also serves to protect the surface of the leveling plate from being damaged by the fierce heat of the welding flame. And while protecting the plate, it insulates it and thus prevents a loss of heat by conduction. No heat is drawn away from the weld and the welder can melt to the bottom of the groove without fear. Fig. 2 shows the asbestos reflector in position.

When these arrangements have been

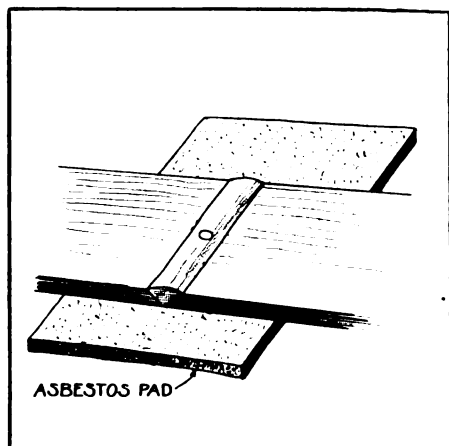


Fig. 2—The Asbestos Pad in Place.

made, the next step is to weld the break. Start the welding on either side of the bolt hole and weld out toward the side of the leaf. First, bring the tip of the welding flame quite close to the bottom of the

groove. Keep it moving in tiny arcs across the groove, watching the metal closely. Meanwhile, the filler rod is heated in conjunction with the heating groove. The filler rod should start to melt directly after

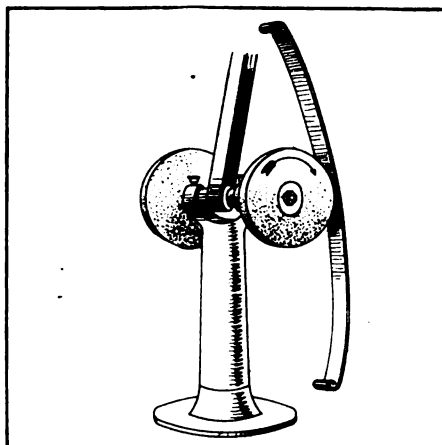


Fig. 3—Grinding the Weld.

the bottom of the groove melts and practically at the same time.

As soon as the groove starts to melt together, the welding flame is drawn back slightly, to insure against burning the spring metal. The flame is then raised and lowered as the melting rate requires. The sides of the groove are next melted to the same state as the bottom of the groove, at which time the melting rod is added by pushing it into the molten groove. The filler metal is not permitted to drip into the weld, nor is it pushed into the weld until it melts.

Sufficient filler metal is added to fill the groove about half an inch at a time the full length of the groove. The weld is not made half an inch at a time as this would seem to infer, but is in reality one continuous weld. When the outer end is reached, the welding is doubled back over the first layer by melting the top of it together with the remainder of the beveled sides and more filler metal; thus the groove is filled in two layers carefully-mixed and fused.

On thinner leaves it is only necessary to weld along the groove once. On heavy springs it is often better to divide the welding into several layers. However, great care must be taken to see that each layer is thoroughly fused with the preceding one.

On top of the last layer is placed a rounded surplus of filler metal; in fact this should be a part of the last layer. Along the top edges of the groove the surplus metal must be thoroughly soaked into the spring metal. The torch is manipulated in such a way as to reduce the filler and spring to one mass; the flame is pointed back and forth along the weld or it is revolved in tiny circles over the melting metal.

After filling the groove on one side of the bolt hole, the other side is filled in a like manner, the chief aim in both welds

being to reduce the metals to a hot fluid state without burning. A tendency to burn is detected by the condition and number of sparks that fly from the weld. Ordinarily, there are quite a number of sparks flying when steel is being melted, but they do not fly so far or stay "alive" so long.

When the steel starts to burn, the sparks increase in size and number until a shower flies out, many of which reach the floor before "dying." Then the welder should draw the flame back and feed in more filler metal. If the sparks are caused by an improper regulation of the welding flame, the flame should be changed.

Regulating the welding flame is an important part of automobile-spring welding. The flame must be strictly neutral. In other words, neither oxygen nor acetylene can be in excess if a good weld is expected. The flame must be regulated so as to be neutral at the start of the welding and kept thus throughout the entire process. The oxygen, particularly, must not be in excess. This is because the steel of the spring oxidizes so easily and the excess oxygen of the flame causes the rate of oxidation to increase until there is danger of turning the whole weld to oxide.

By oxidation is meant what we call burning; the metal is literally burned to a cinder. Therefore, the spring-welder must be careful to have no more oxygen in his flame than will be consumed by the acetylene. An oxidized weld is porous and weak. Too much acetylene also is bad since it renders the weld weak and brittle. Therefore, keep the flame neutral all the time and manipulate it deftly.

In importance equal to the proper flame and its correct handling is the filler metal and its correct manipulation. Automobile and truck springs require special steel filler rods. These may be obtained from any manufacturer who specializes in the business. However, it is not necessary to buy the special rods. Instead, the welder

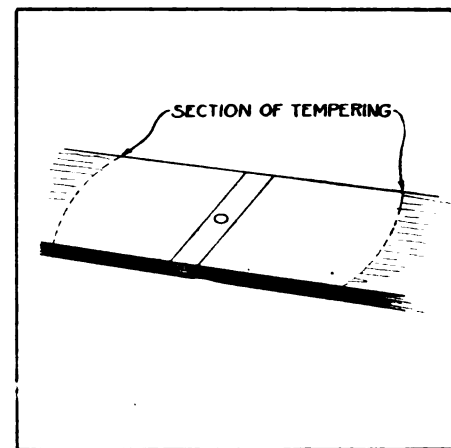


Fig. 4—Reheating After Grinding.

can make some very good filler rods by getting some ordinary coil springs and straightening them.

The wire in these springs should be not  
(Concluded on page 46.)





## Why Mechanics Approve It

**T**HERE has long been a demand from mechanics and motorists for an efficient piston ring having the quick-seating feature of a narrow ring, with the wall tension of a wide ring.

It is obvious to any mechanic that when the BURD Quick-Seating Piston Ring is installed in worn cylinders, the outer edges will lap in more quickly and conform more nearly to the contour of the cylinder wall than any other type of piston ring.

Mechanics know also that it is desirable to minimize the loss at the opening of the piston ring to prevent leakage and carbon troubles. BURD Quick-Seating Piston Rings are installed to fit snugly—the points just meeting—no clearance between the points being necessary. They therefore indicate the minimum of opening after seating has been accomplished.

The BURD Quick-Seating Piston Ring is of the step-joint type, the outer surface—which comes in contact with the cylinder wall—having a channel .002 of an inch in depth in the center of the face, and raised edges which lap in quickly, seating perfectly with a hard, glass-like surface in harmony with the cylinder wall in about one-fifth of the time required to seat other types of piston rings.

The channel in the center carries an oil film that prevents leakage during the process of seating and insures perfect lubrication.

*BURD Quick-Seating Piston Rings are made in all sizes and oversizes for practically every make and model of gasoline engine. List Prices: Sizes up to and including 4 inches, 60c each, and sizes over 4 inches, up to and including 5 inches, 70c.*

**Order from Your Jobber or Write Now for Directory of Sizes, Literature and Dealer's Price List**

**BURD HIGH COMPRESSION RING COMPANY, Rockford, Illinois**

# Readers' Questions and Answers

Conducted by E. C. Pohlmann

## Timing Overland 90.

Will you kindly tell me how to time an Overland 90? What would you recommend for a good grease cup or oil cup for car lubrication? The present grease cups get clogged even when I use soft grease. I would like to find a cup which would lubricate the springs in good shape as well as the other parts of the car.—F. W. S., N. H.

To time the Overland 90, proceed as follows: Turn the motor over slowly until the position of No. 1 cylinder is on upper dead center (this can be determined by inspection through the sparkplug opening)

and the marks  $\frac{1-4}{U-P}$  on flywheel are directly in line with the punched indicating mark on the rear end of the cylinder block.

When the piston is in this position, the push rods should be free and have a clearance of 0.003 inch.

Then proceed to turn the motor over slowly until the push rod that operates the first valve of No. 1 cylinder begins to bear against the end of the valve stem.

At this instant the exhaust valve of No. 1 cylinder is beginning to open and the mark  $\frac{1-4}{E-O}$  on flywheel should be directly in line with the punched indicating mark on the rear end of the cylinder block. A slight variation either way from the mark is permissible, but it should not exceed  $\frac{1}{4}$  inch.

All the cams are cut integrally upon the camshaft and consequently if the valve is properly timed, all valves will be correct.

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

shown in the accompanying illustration, and check up as outlined in the preceding paragraphs.

Then replace the chain from the crankshaft gear to the generator drive gear and proceed to time the ignition.

Again turn over the motor until No. 1 cylinder is on upper dead center (this can be determined by feeling the pressure of air that is expelled from the cylinder through the pet cock as the piston reaches the top center) and mark  $\frac{I-A}{U-U}$  on flywheel is in line with the punched indicating

With the flywheel in this position, set the timer so that the distributor arm is in line with the terminal of the wire which leads to the spark-plug of No. 1 cylinder and the breaker points are just opened.

It is the policy of the AMERICAN GARAGE & AUTO DEALER not to recommend any specific make of part, accessory, automobile, etc. You will find that any make of spring compression grease cups will prove very satisfactory for chassis and spring lubrication. In such a cup the grease is constantly under a slight pressure and readily flows between the moving parts as they are used. Oil mixed with graphite is a very satisfactory lubricant for the chassis and springs and can be used in any ordinary oil cup. It is essential, however, that oil cups be placed in a vertical position.

\* \* \*

## Fordson Speeds.

What are the speeds of the Fordson tractor?—T. J., Minn.

When the motor is turning over at 1,000 r. p. m. the speeds are:

Low:  $1\frac{1}{2}$  miles per hour.

Intermediate (plowing):  $2\frac{1}{2}$  miles per hour.

High:  $6\frac{1}{2}$  miles per hour.

Reverse:  $2\frac{1}{2}$  miles per hour.

\* \* \*

## Storage Battery Capacity.

Please tell me how to determine the ampere-hour capacity of a storage battery by the size, thickness and number of plates they contain. Also give me the intermittent rating and five and eight hour discharge rates.—M. E. P., Wis.

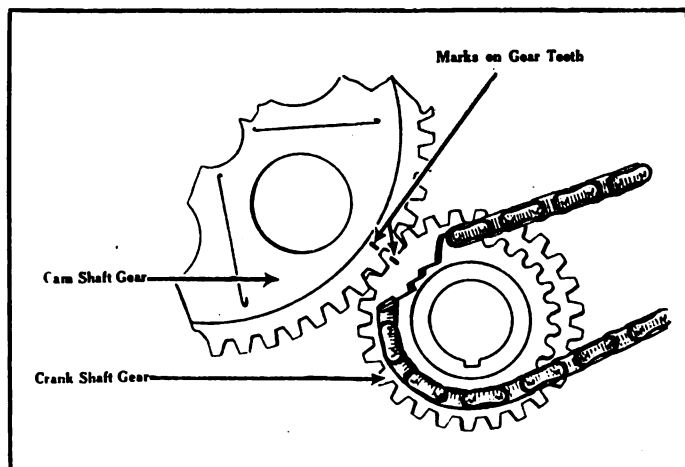
The capacity of a storage battery depends on several factors. These are:

1. Character of active material.
2. Porosity of active material.
3. Disposition of active material.
4. Quantity of electrolyte.
5. Density of electrolyte.
6. Rate of diffusion.
7. Temperature.
8. Rate of discharge.

To give the theoretical method of determining the ampere-hour capacity of a storage battery from the size, thickness and number of plates, and include all of the aforesaid factors would require more space than we could give and then the discussion would not be complete.

For a complete discussion of this subject consult "Storage Battery Engineering" by Lamar Lyndon, published by the McGraw-Hill Publishing Co., New York.

Ordinarily, however, the capacity obtainable from electrodes ranges from 40 to 75 ampere hours per sq. foot of positive plate (both sides included) depend-

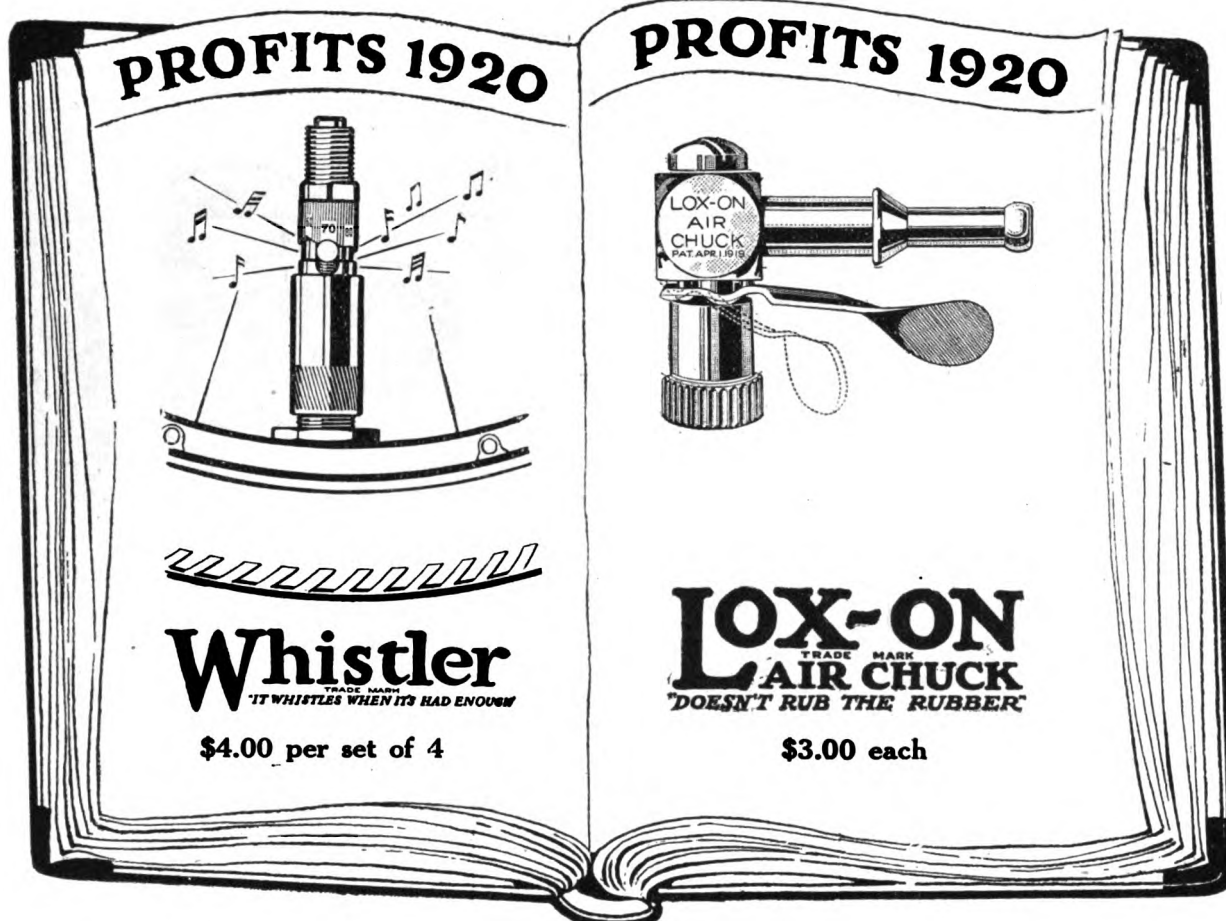


The Position  
the Gears on  
Overland 90  
Should Be In  
When Replacing  
Them, In Order  
to Obtain  
Correct Timing.

If the timing gears have been removed for any reason, the units must be reinstalled with the gears in the proper relation to each other as indicated by the marks stamped on the teeth of the gear as

mark on the rear end of the cylinder block.

Retard the spark lever on the steering column, remove the distributor head, and turn the flywheel one inch past the indicating mark.



## Both on the Profit side of the Ledger

**T**HE Whistler Pressure Regulator and the Lox-on Air Chuck are both assets. They are steady, consistent sellers, always on the move and always profitable.

The Whistler has made more friends in the shortest time than almost any other accessory ever introduced. It is a big idea, merchandised in a big way and already a big success.

The Whistler fits right on over the ordinary tire valve. When you put air in the tire, you simply set the Whistler for the pressure desired. As soon as that pressure is reached, a cheery whistle announces "enough"! You can't put any more in. It *automatically* closes.

Tire life is lengthened 50% to 75%; gasoline mileage increased 20%; and time and trouble saved 100%. No wonder it's such a seller! And so well liked!

The Lox-on Air Chuck is the ideal chuck for garagemen. There is no worry about leaks, changing worn-out rubber washers and blow-offs. The Lox-on *grips* the valve tightly and holds until you want it off. It is easy to snap on or off. Can't leak and lasts many times as long as ordinary chucks.

Start 1920 building for bigger, better business. Get these two new-comers with records that look like old-timers. Write us for details of our big advertising and merchandising campaign.

**AUTOMATIC SAFETY TIRE VALVE CORP., 1765 Broadway, New York**  
**Factory, Long Island City, New York**

ing on type, density of electrolyte, and other conditions.

The capacity of the Planté plate is from 40 to 60 amp. hrs. per sq. foot, depending on thickness and porosity of active material.

The following table gives the percentage of capacity variation at different discharge rates:

Percent of capacity at 8-hour rate:

Rate hr.	Planté pos.		
	Planté (1)	Pellet neg. (2)	Pasted. (3)
8	100	100	100
7	99	97	96
6	96½	93½	92
5	93	89	86½
4	88	83	80
3	80	75	72
2	70	65	61
1½	63	57½	53½
1	55	50	46

To illustrate this table: Take for example the ordinary storage battery of 80 ampere-hours capacity and you want to find out what the 5-hour discharge rate is. It is seen from the table that for the ordinary battery which is usually a Planté, the percentage of capacity of 8 hr. rate for a 5 hr. discharge rate is 0.89. Multiplying 80 by 0.89 gives us 71.2 ampere hours or 14.25 amperes for 5 hours. The value of the percentage of capacity of 8-hr. rate can also be obtained from the curves herein given for various plates and for any number of hours or fraction thereof.

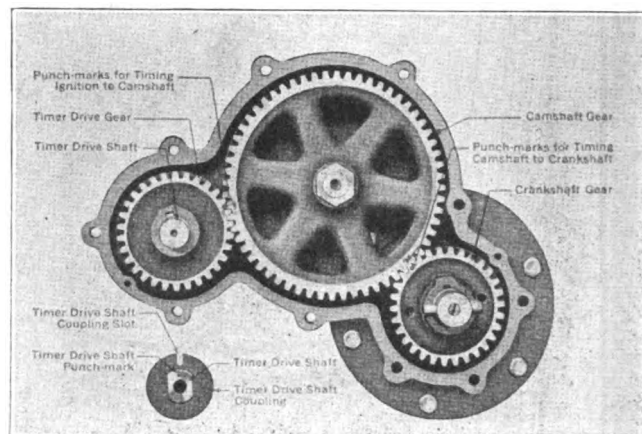
A simple practical formula for compu-

ting the normal capacity of a cell at the 8-hr. rate when its output at some other rate is known is:

$$I \times T \times K = A.H.$$

I is equal to discharge current in amperes.

**Position of Timing  
Gears on Maxwell  
When Replacing  
Them to Obtain  
Correct Timing.**



T is equal to the time of discharge.

K is equal to the factor corresponding to the rate of discharge.

A.H. is equal to the capacity in ampere hours of cell at 8-hour rate.

The following are the factors for K:

8 hours equal	1.00
7 " "	1.03
6 " "	1.07
5 " "	1.13
4 " "	1.21
3 " "	1.33
2 " "	1.54
1½ " "	1.74
1 " "	2.00

thing and made a careful investigation, hoping to be able to discover the trouble. I have found nothing wrong, and as a result I am inclined to think that I haven't timed the engine properly. Will you please give detailed instructions for timing this engine?—G. F., Mo.

On the rear end of the timer drive shaft, you will find a punch mark. This punch mark and the slot in the timer driveshaft coupling should be assembled in line and on the same side of the drive-shaft center.

The timer drive gear and camshaft gear are punch-marked with a double mark on a tooth of the former and between two teeth of the latter. See the accompanying illustration.

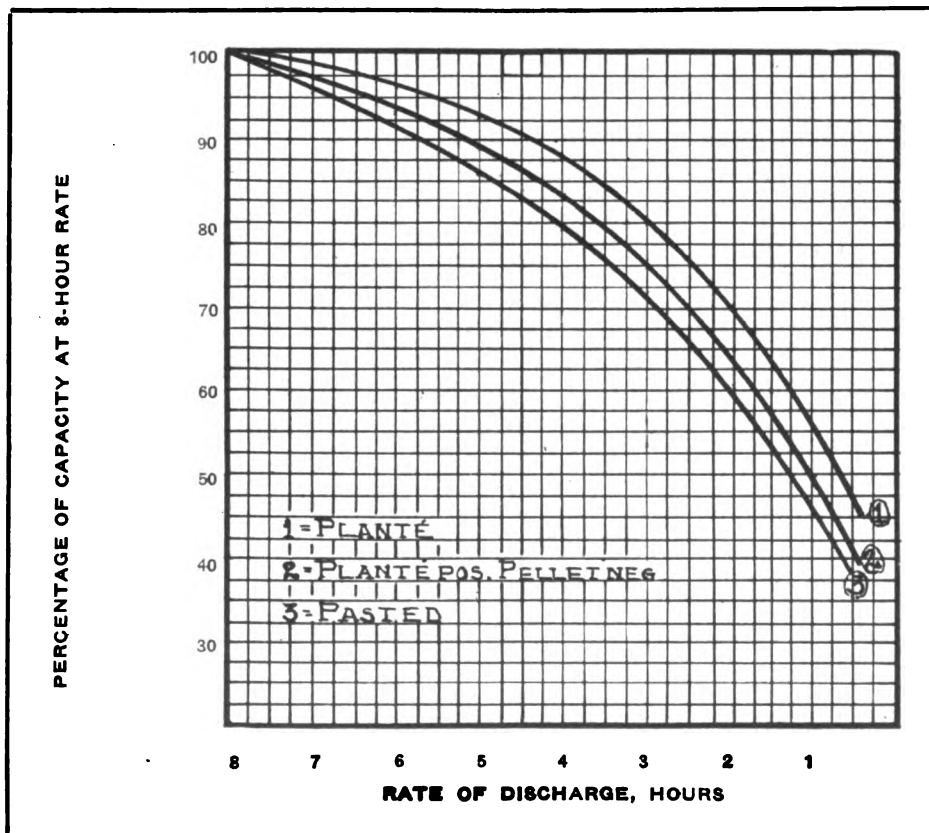
The double marks should be together at the same time the single marks on the crankshaft gear and camshaft gear are together. When the gears are so assembled, No. 1 piston should be in firing position and the slot in the timer drive-shaft half of the coupling should be up.

If these gears do not mesh as just explained, remove the gears, place No. 1 piston in firing position and assemble the gears so that the double marks are together when the single marks on the crankshaft gear and camshaft gear are together.

Then examine the timer drive-shaft half of the coupling and if the slot is up, remove the distributor cover; the distributor arm should be opposite No. 1 segment. The front right terminal on the distributor cover is No. 1.

If the timing does not check up as previously stated and the coupling has been loosened on the timer coupling shaft, proceed as follows:

Turn the crank shaft with the hand crank until No. 1 piston is 1/32-inch past top dead center or 1¼-inch past on the flywheel, on the end of compression and the start of the firing stroke. Turn the timer coupling shaft until the distributor arm is brought into position opposite No. 1



Curves Giving the Percentage of Capacity at 8-hr. Rate for Different Discharge Rates.



## Prepare NOW for the Busy Season just ahead



### Erect a FEDERAL ELECTRIC SIGN

Now is the time to plan to double your business. From now on people will use their cars more and more. It is up to you to let them know who you are and where you are located, so that they will not pass by to your competitors.

A Federal Electric advertising display will direct the attention

of all automobile owners in your territory, and many transients as well, to your garage. When they know where to find you they will deal with you. It can be seen from a distance in either direction and from the cross streets as well. They can't miss your garage if you have a beautiful, sparkling Federal Electric Sign.

### 12 Months to Pay

This handsome Federal Electric Sign is made of porcelain enameled steel and cannot rust, decay, fade, or crack, whether in mild Summer or stormy Winter weather. Costs but a few cents a day for electricity—no other expense. Never needs painting—an occasional washing keeps it sparkling like new.

And you have 12 MONTHS TO PAY for this sign. The first payment brings you the sign and you have the remaining 12 months to complete the payments. Send the coupon today for full information—no obligation.

**SEND COUPON TODAY**

### FEDERAL ELECTRIC COMPANY, representing Federal Sign System (Electric), Lake and Desplaines Sts., Chicago:

Please send me full information on the Porcelain-Enameled Sign. Explain your 12-Months-to-Pay plan.

Name ..... City .....

Street and No. .... State .....

Business ..... Position .....

(AGAD-3)

segment in the distributor. Retard the breaker by placing the spark lever at the top of the quadrant. Then turn the timer coupling shaft by the knurled collar until the platinum points just break; that is, just separate.

Hold the coupling shaft in this position, turn the coupling on its shaft until the coupling pin is opposite the notch in the drive shaft half of the coupling, and tighten the coupling clamp screw, couple the timer to the engine, bolt it to the bracket and connect the terminals in the proper firing order of the engine; namely, from left to right or clockwise, No. 1, 3, 4, 2.

\* \* \*

### Interested in Welding Repairs.

I own a small garage and repair shop, but do no welding. I am interested in the work and think that I could make more money if I knew how to do welding repair work. How can I learn this work, and what tools would I need from the start, and about how much would they cost? Can you give me the names of some good books on welding for beginners and where can I buy them?—J. C., Minn.

You certainly can make more money if you install a welding plant in your repair shop. In fact, you can scarcely afford to be without one nowadays, since it would enable you to make repairs with it that can be made no other way.

Perhaps the best way for you to learn to do welding is by actual practice and the reading of good welding books. Nearly all manufacturers of welding outfits furnish enough instruction to enable you to learn how to regulate and manipulate the torch. Then it will depend upon your natural ability to learn and the amount of

practice you get. Of course, there are several welding schools that you might attend, but they are not always available.

The tools you would need, outside of small hand tools such as you no doubt now have, are an acetylene generator, a drum or two of oxygen, the necessary gages, regulators, a hose, and a completely equipped welding and cutting torch. You can use tanked acetylene if you prefer, although it is more expensive.

Most of the preheating apparatus you can devise in your own shop, at least for a starter. A complete list of necessary apparatus will be furnished free by any manufacturer of welding equipment. The cost will probably run from \$100 upward, depending upon the size and quality of the outfit.

There are several good books on the subject of oxy-acetylene welding. The best, perhaps, is one entitled "Autogenous Welding" by Granjos and Rosemberg, an English translation of a French book, but very complete, \$3. Another one is "Automobile Welding," by Keith Dunham, \$1.25. Robt. J. Kehl is the author of another entitled "Oxy-acetylene Welding Practice," \$1.

Any or all of these books can be purchased from the Acetylene Journal Publishing Co., Peoples Gas Building, Chicago.

\* \* \*

### Repairing Stripped Teeth.

In the February issue, I read an answer to the question by E. H., Ill., concerning the repairing of a flywheel on a Hudson 6-54 which had six teeth stripped.

The way I would repair this job would be to cut the stripping teeth off smooth, then bore a number of small holes in each of

the teeth and thread them. Into these holes I would screw in threaded rods of a suitable size, cut them off at the right height and file them to the shape of the teeth.

I have tried this and have found it gives good results if properly done. The rods should be cut somewhat longer and flattened down to keep them from getting loose.—L. J. P., Kan.

\* \* \*

### Fordson Lubrication.

Please tell me what grade of lubricating oil the Texas Oil Co. recommends for the Fordson Tractor?—J. H., Cal.

According to the latest tractor lubrication guide of the Texas Oil Co., Texaco tractor oil "C" should be used during the summer and Texaco tractor oil "D" during the winter.

\* \* \*

### Elgin Data.

I certainly will appreciate answers to the following questions:

1. What is the bore and stroke of the Elgin motor?
  2. What is the S. A. E. rating?
  3. Where can you find the serial number?
  4. How much does this car weigh?
- Please publish the wiring diagram of this car?—N. W., Wyo.

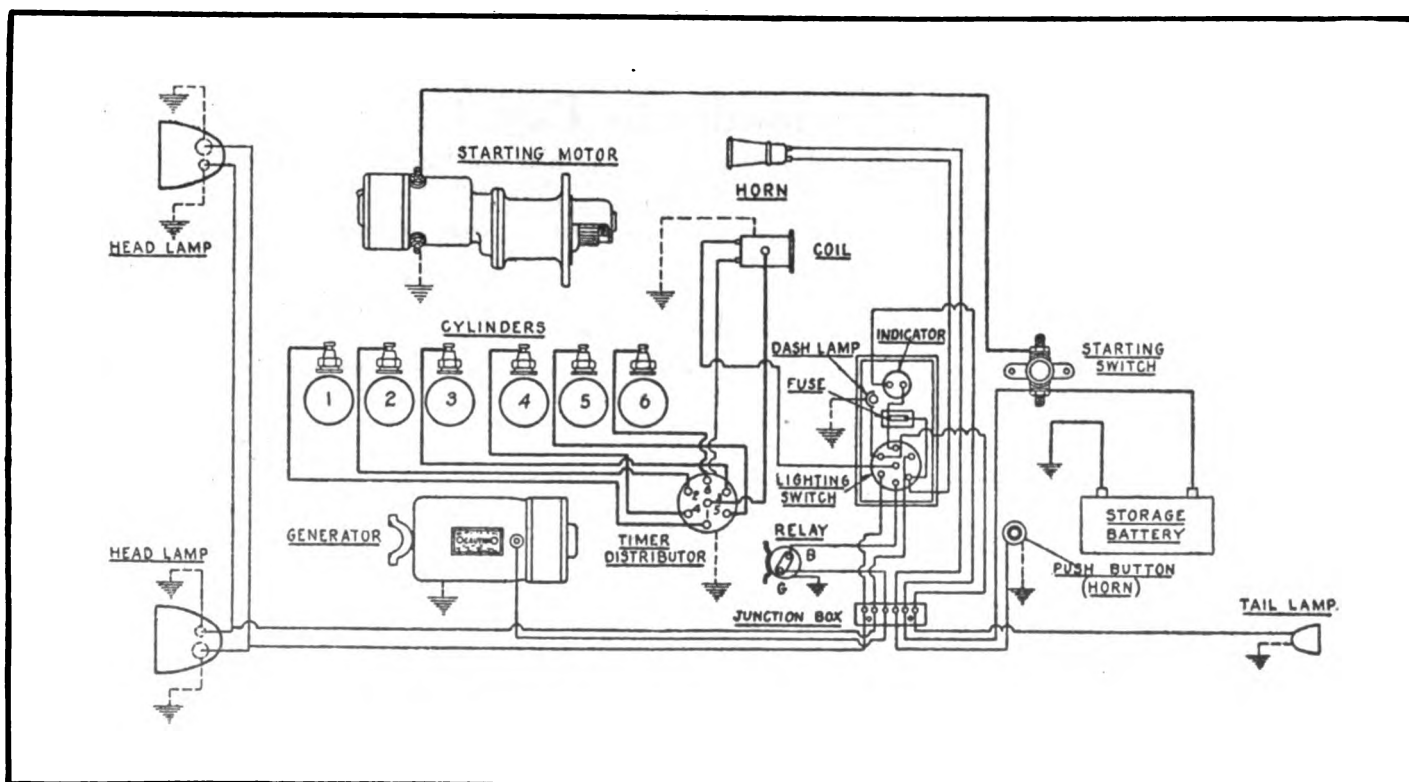
1. The bore is 3 inches and the stroke is 4¼ inches.

2. The S. A. E. rating is 21.6 H. P.

3. The serial number will be found on the right side of the dash under the hood.

4. The shipping weight is 2,500 lbs.

You will find the wiring diagram on one of the pages of this department.



The Wiring Diagram of the Elgin Six.

# Farm Journal Advertised Goods in Dixon, Ill.



Boynton-Richards Co., with stores in Dixon, Amboy, Sterling and Morrison, Ill., hit the nail on the head when they said in their advertisement, "We don't sell advertised goods in our four stores just because they are advertised. We choose the advertised lines that live up to their advertising."

Because The Farm Journal accepts only those advertisers who do live up to their advertisements, merchants in all lines will find it easy and profitable to sell goods featured in its advertising columns.

More than a quarter of a million more farm families read The Farm Journal each month than any other farm paper. That is why it sells most goods for live dealers in every prosperous farm community.

## Among Farm Journal's Representative Advertisers Are

Shaler Vulcanizers  
Burpee-Johnson Shock Absorbers  
Ajax Tires  
Weed Tire Chains  
Cleveland Tractors  
Ever-Tyte Piston Rings  
Goodrich Tires  
Hassler Shock Absorbers

Maxwell-Chalmers Automobile  
Leak-Proof Piston Rings  
Diamond-Grid Batteries  
Racine Tires  
Packard Trucks  
Stewart-Warner Speedometers  
Willys-Overland Cars  
Firestone Tires

### "National Unrest and the Remedy"

It will be a pity if it is necessary for farmers to starve out capital and labor to stop their fighting. And the chance is that it will not be necessary—that the powerful balance-wheel of farm opinion will steady the industrial machine. Just how this will be done is clearly shown in a new and interesting article with the above title, the first part of which appears in The Farm Journal. Be sure to read it if you wish to help toward the end of unemployment.



### The Christmas Farm Journal contains the cream of farm features

For the final month in the year, December, the very best features of the whole twelve-month have been reserved. The character of the articles, illustrations, stories and other special features reach the highest level ever attained by a farm publication. Every page—whether it contains facts, figures, pictures or fiction—is of the greatest interest to every progressive farmer and his entire family. Don't fail to read this splendid Christmas number from cover to cover.

### Potash Replaces Manure As Fertilizer

In the third section of his epoch-making fertilizer series, A. B. Rose scores the most important point he has yet made. It is shown that in 25 years of practical tests, a phosphatic acid-potash fertilizer in the proper proportion (2:18) is the only one which has proved itself the equal of 16 tons of stable manure to the acre. Manure is rapidly becoming scarcer, due to the horse which the automobile and the tractor are making on horses, and to other causes. It is supremely important to find, therefore, that by spraying clover and the fertilizer formula given above, farmers can maintain the soil at the highest possible production basis, even without a pound of manure. Be sure to read this amazing article in the December number of

## The Farm Journal

"Over 1,000,000 a Month"

### Other Attractive December Features:

#### Illustrated Articles—

"Prove Use of Bait"  
"The Effect of Winter Manure on a Plowed Cornfield"  
"What My Countryman Do"  
"Do You Want to Save Your Horse?"  
"How to Breed Your Best Prospect"  
"The Importance of Potash"  
"What Kind of Road Shall I Use?"  
"One Day's Work Among the Rules of Farming"

#### And These—

"How Farmers Should Buy Life Insurance"  
"Make Your Old Time Pay You"  
"A Short and Pleasant Car"  
"Lure of Lure"  
"Playing on a Field"  
"Hunters vs. Fox"  
"The Wonderful Treatment of Pests"  
"Pay Less on the Country Store"

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We sell and recommend nationally advertised, standardized products, especially those advertised in The Farm Journal. Back of each of these products so advertised, is the quality guarantee of the manufacturer, which stands as a protection to us and to our patrons.

Our four stores have always featured "Standardized" merchandise. We've found it pays our customers to buy such goods. Being nationally advertised they are known to you before you come to us for them. The makers' good name and reputation guarantees everything he makes—the good will of the consumer is his biggest asset. The successful continuance of his business depends on his satisfying each and every user. His product "repeats" only on its own merits.

You'll see most of the merchandise we sell advertised in a big way, month after month, year after year. This can only mean that the advertised article has "made good"—that thousands of customers are consistent users.

There is no other advertisement that does not make a difference in the cost of a good.

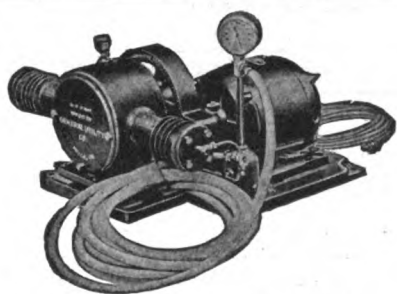
# The Farm Journal

Moves most goods because read by most farm people

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NEW YORK  
15 East 40th Street



### The Direct Model

The standard GENERAL Compressor, mounted on bed plate with  $\frac{1}{2}$ -horse, ball bearing, G-E motor (A. C. or D. C. 110 V. or 220 V.). Delivered ready for service.

New York—Space D-137

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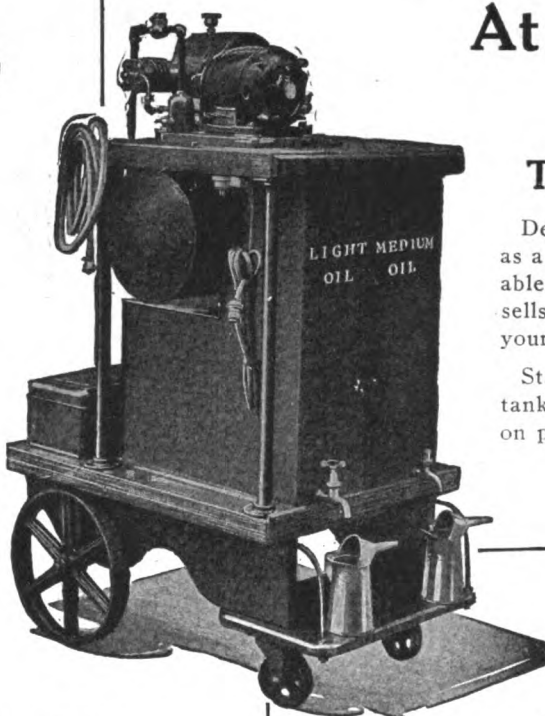
**Exhibited at the  
National Automobile Shows**

**T**HE superior efficiency of General Air Compressors is directly due to their horizontal opposed 2-cylinder construction. They deliver two-cylinder efficiency at one-cylinder cost. They will inflate an average sized tire in two minutes.

Their construction insures the greatest reliability and low maintenance cost. They are built in our own factory which is equipped with the most modern machinery and has proved itself capable of turning out compressors of a uniformly high quality that gives place to the product of no plant in America.

General Air Compressors are furnished with outfits to meet all garage and service station needs. Write for descriptive literature and name of nearest distributor.

*We want to get in touch with distributors to cover some desirable territory still open*



## Clean, Cool Air At Low Cost

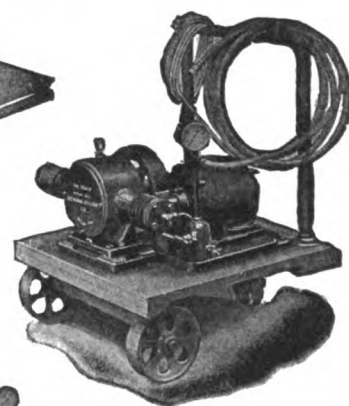
### The Utility Model

Designed to use Free Air service as a direct money earner. A portable air outfit and oil service. It sells oil to the motorist who uses your air service.

Standard Compressor with air tank, two oil tanks, and tool box, on portable stand.

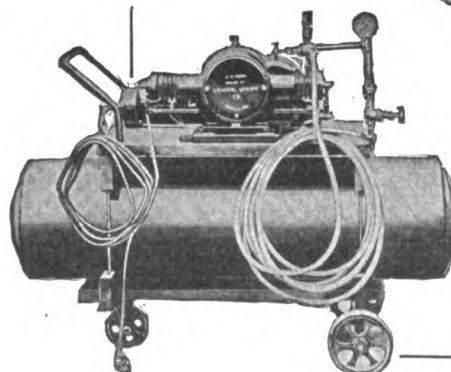
### Direct Portable Model

—With ball bearing equipped truck and complete equipment ready for service.



### Portable Service Model

—For giving tank service right at the car. Standard compressor rigidly mounted on top of tank. Automatic start and stop switch. Also furnished as stationary outfit.



*Two Cylinder*  
**GENERAL**  
AIR COMPRESSORS

# UTILITIES SALES

*Sales Rep*

**GENERAL UTI**

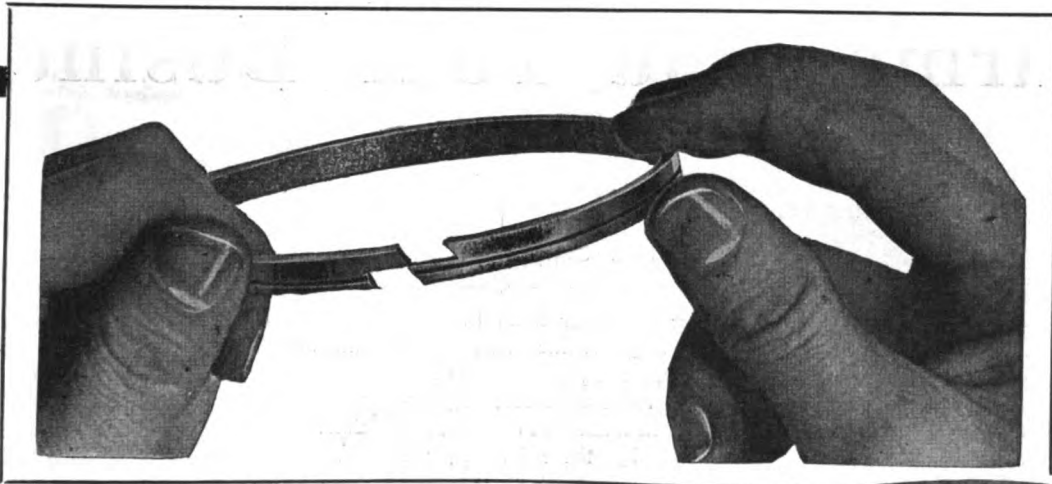
Factory 1324 Ogden St. Philadelphia—Office 80

## Utilities that Sell

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Digitized by Google





## Trench vs. Open Warfare Against Friction

THE trench-like, oil carrying groove of the General Lightning Cut Piston Ring changes the open warfare against friction as now waged in automobile cylinders into a new and scientific trench warfare.

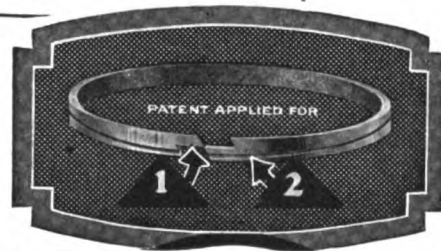
This remarkable improvement in piston ring design, reaching and lubricating heretofore untouched high points on the cylinder wall, as well as the ring itself, protects and greatly prolongs the life and efficiency of the ring.

Oil, controlled by the scraping edge of this groove and returned to the crank case, represents more than an economy; it eliminates the formation of just so much carbon.

## GENERAL LIGHTNING CUT PISTON RINGS

are individually cast; concentric in shape and of one piece construction. There are reasons why for all three manufacturing decisions. The results obtained are invariably more power, more mileage, less fuel, less oil, less friction and less wear.

*Write for further details and sales proposition.*



1. The Lightning Cut.
2. Oil Distributing Groove.
3. RIGHT: Shows shape of oil groove. Note Scraping edge.

BOTTOM: Shows upward course of oil groove.



# CORPORATION

Representatives

ITY COMPANY

New Stock Exchange Bldg., Philadelphia

Because They Serve

Two Cylinder  
**GENERAL**  
AIR COMPRESSORS

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Digitized by Google

# The Farmer and Your Business

Few People Know Farmer's Place in Business—We Must Remind Ourselves that Our Prosperity Rests upon Agriculture—Many Fail to Appreciate This Importance—Abstract of Address before the Farm Paper Conference

By Arthur Capper

*United States Senator from Kansas and Publisher of the Capper Farm Papers*

I am afraid that we too often forget or overlook the very fundamental part the farmer plays not only in business but in our very existence.

It is the farmer's business to feed and clothe the human family. At any time in the history of the world, the race is only a few weeks, or months, at most from starvation. Let the farmer cease to produce for a single season; cut off the yield of field and flock and herd, of vine and tree, and we perish. The coal from the mine, the oil from the crevices of the earth, the fall of the mountain stream, supply part of the energy that turns the wheels of business; but the greater power—the man power—is merely the food grown by the farmer, converted into human energy. The calories of heat under your boilers are not so vital to your business as are the calories of energy in your workmen. A strike in the coal mines paralyzes business; but a strike by the farmers would utterly destroy business because it would destroy life itself.

So then, in the first place, if business is to deal wisely and equitably and for that matter profitably, with the farmer, it behooves us to remember what we owe to agriculture; or if we do not recognize the obligation, at least to remember how dependent upon it we are.

A nation cannot grow rich swapping dollars. The farmer is the great producer of real wealth. It is his business that makes the wheels of every other business go round.

While thousands and thousands of farmers have lost money this year, either in crops or livestock, yet the farmers of the United States have produced enough wealth to pay off two-thirds of this country's net war debt, the total commercial value of their product this year being well over 15 billion dollars, or about 1½ billions more than last year. And this was accomplished under even more difficult price and labor conditions than in war-times.

Last year the value of the American farmers' crops, measured by our depreciated dollar, was \$15,873,000,000, while the five-year average, 1910-1914, was \$5,829,000,000. The value of his livestock in 1919 was \$8,830,000,000—making a total of nearly 25 billion dollars from crops and livestock combined. These figures, as a matter of course, are not accurate to the penny. They do not necessarily represent the net income or profits of the farms of

America, but on the other hand they do not tell his total gross income. While hired help, interest, rent, taxes and other fixed charges are to be deducted, in practically every case in addition to the money crops represented by these billions, the farm has produced the greater part of the food of the family—a no inconsiderable amount for six million families.

I wish I could take you today and set you down in a typical farm house of the Middle West, that you might see for yourself the actual living conditions of the American farmer. I wish you might spend a half-day with a good county-seat mer-

---

## SUCCESS NO SECRET.

**"There is no secret about success. Success simply calls for hard work, devotion to your business at all times, day and night. I was very poor and my education was limited, but I worked very hard and always sought opportunities.**

**"To win in the battle of life a man needs, in addition to whatever ability he possesses, courage, tenacity and deliberation. He must learn never to lose his head. But, above all, hard work is the thing."**—Henry C. Frick.

---

chant, inspect his stock of high-grade goods and see the variety and quality of the goods the farmer buys. I have never yet known a man to make a personal investigation of this sort who has not been surprised by what he has seen.

I cannot help feeling astounded at times at the indifference of so many manufacturers to the rural market. I remember a few years ago when I was actively in the publishing business, our New York manager telegraphed us in Topeka asking us to interview a dozen of the leading jobbers in our immediate territory in regard to the sale in four agricultural states of a staple article of the hardware trade. I replied that we would make the investigation, but suggested that he run over to Philadelphia and interview the sales manager of a manufacturing company that did the largest business in the world in that specialty—a company that had been engaged in that one business for 40 years. It seemed to me that

would be a quicker way to get accurate information.

And our New York office wired back, "He's the man who wants the information!"

In business for 40 years and didn't know that the farmer families of the nation were his best customers!

Now I believe that that same condition exists even today in many business houses. Or even if the manufacturer realizes that his wares are purchased by the farm family, he does not appreciate the necessity of cultivating that trade through the one medium that the farm family looks upon as its "Buyers' Guide"—the agricultural press.

And that's too bad for you as advertisers; and bad for us as publishers, and bad, too, for the rural community.

I say it is bad for the rural community, because I believe that the real purpose of advertising—its primary mission—is to serve my subscribers rather than to serve you advertisers. As we sometimes put it, "It is more important to the nation that the farm homes of our States have an appreciation of good music than that you sell pianos or phonographs. It is more important to the nation that farmers buy tractors and modern machinery than that you sell them. It is more important that the farmer's scale of living be lifted to a higher plane than that you be enabled to do a larger volume of business."

I consider the advertising columns of my papers of as great importance to my subscribers as my editorial pages. And I am not straining a point when I say that you manufacturers and advertisers of worthwhile commodities owe a duty to the farmer—nay, more than that—a duty to the nation, to bring to his knowledge everything that will be of value to him in his work and in his life.

We must remind ourselves again and again and yet again that our prosperity, our very existence rests upon agriculture. The American farmer must not only be made an efficient producer, but he must live a life befitting a citizen of a great republic. We have no room in America for a peasant class. The American farmer, in education, in real culture, and in the refinements, conveniences and comforts of wholesome living must not fall behind his city brother. We cannot afford to put a premium upon urban life. If you believe in your business; if you believe that you have a commodity that is worth while; if you

*(Concluded on page 48)*

# Better than ELBOW Grease for Cleaning and Polishing Your Car



Frequent washing harms the finish of an automobile. Gets dimmer and dimmer as the varnish loses its life. Often check marks appear.

Unless the car is very dirty, give the cleaning job to

## Waxit

"The Perfect Polish"



It *cleans* and *polishes* all in ONE operation. It will surprise you to see how quickly dust and grease disappear and brilliancy of finish comes back. After every washing, give the car a rub with WAXIT. Any surplus water wipes right off with your polishing cloth. WAXIT is soluble with water. WAXIT benefits finish. Keeps it alive and elastic. Gives a hard, dry finish that doesn't collect dust.

No wonder car owners are enthusiastic over the merits of WAXIT! It repeats, *repeats*, REPEATS. Finest thing, too, for pianos and furniture.

Write for full size package, and our liberal proposition to dealers.

**Waxit Manufacturing Co.**

1539 Plymouth Bldg.  
MINNEAPOLIS, MINN.

WAXIT MFG. CO., 1539 Plymouth Bldg., Minneapolis, Minn.  
Kindly send us package of Waxit as per your offer in  
American Garage.  
Name .....  
Address .....  
City .....  
State .....

### What Is Your Salary?

(Concluded from page 14.)

He was convinced that there must be a change and that too at a very early date. He had no money to waste but he determined to consult a business doctor or expert—and he argued rightly that he couldn't afford a cheap one whose services would be of doubtful value. When he had located the right man he told him the whole story, concealing nothing, and laying before him a complete financial statement of assets, liabilities, and accounts and figures for the past year.

The business doctor said pleasantly, but firmly: "Man, you are traveling on the wrong principle altogether, and as a result you are on the very edge of failure. But, we may be able to save the day. As soon as your credit began to fail, your business suffered, and when you cut down your salary you ceased to be self-respecting.

"You have put in twice as many hours as anyone else, have worked harder and carried the responsibility. Consequently *your salary was as honest a business debt as that of any other creditor*. You have done yourself an injustice to ignore it. It is necessary for you to live and for your family to live, and when you got into debt with no prospect of paying, you were not fair to the butcher, the grocer, the coalman and the milkman. It was as broad as it was long. You should have taken your salary and paid your living expenses. As it is, you have let these accounts go and have paid others who had a less claim.

"I find that you are solvent, although you have not sufficient liquid assets to handle your business. The thing to do is to go to the bank, put up some collateral security, and borrow money to wipe out these outstanding obligations which are nagging the life out of you. Then you will have assembled your indebtedness into one large sum and you can go about reducing it with the absolute certainty that it will take time, but that you will succeed in the end.

"Begin to draw your salary at once. Eat well, dress well, use such publicity to promote business as you can afford, and I think you will see a change, yes a great change within six months.

"You will have to plan to reduce your debts, and *here's the way to do it*:

"Calculate the interest for one year;

divide that interest into weekly payments and put that fixed amount into the bank in an account by itself regularly. This means that an individual by the name of 'Interest' is on your payroll and you must plan to pay him the same as you do other help. If you do *that* you will have no trouble being ready with your interest money when it is due.

"But paying interest really does not get a man very far ahead. Sometimes, in fact, it puts him away behind. Every six months take your inventory and figure your net profit. Now the amount of your net profit must be divided into three sums.

"The first sum is for reinvestment, enlargement and business expansion. This sum must be very carefully spent, for if you do as you ought to do with it, it will spell the measure of your future success.

"The second sum should be set aside as an emergency fund. It is wise to put it in a bank by itself so that it is always available, if you find yourself in a corner or where you need ready money to put across a profitable deal. If you use it, however, consider it a loan from that account and return it as soon as you can.

"The third or last part of the net profit must go to reduce the principal of your debt. If you can make a regular payment on it every six months, you will soon wipe it out altogether.

"You will notice I have allowed you no dividends for yourself or profits.



Here is a Garageman Who Makes a Nice Profit From Renting Fords—Any Person Who Deposits \$10 Can Obtain the Use of a Ford at \$1 an Hour Providing He Drives the Car Himself—Special Rates to Business Men.

You cannot expect any until you get out of debt. On the other hand, every dollar you pay toward reducing your debt is making you richer and increasing your equity in the concern just so much. In reality you are taking the money out of one pocket in your trousers and putting it into another.

"Some day, and that sooner than you expect, the borrowed money will be paid back. For you see that the principal is growing smaller all the time and the interest less, and your business is growing larger and stronger to take care of the situation. It is all simply a matter of common sense and sticking to the plan I have mapped out."

Today our friend, who was once on the point of bankruptcy, is drawing a handsome salary. It is large enough to enable him to make savings regularly out of it and invest these savings in trust for himself and family no matter what comes. By this arrangement he knows that his future is secure and his private fortune is continually increasing. His business is conspicuously prosperous, being the leader in its field.

The reason that it has continued to be a leader is because the man at the head of it has continued to observe sound business principles and has never allowed his prosperity to cause him to be careless or indifferent.

Throughout his business career he has had an accounting, such as described, every six months. He has paid his debt and has made the division of the net profits according to his best possible judgment. As a result he will be able to retire and enjoy life many years earlier than he otherwise could.

Draw your salary regularly and let it be in accordance with the payment given others at the present time for the same degree of responsibility, foresight and actual work, but keep a weather eye constantly on the increasing value of your capital

### N. A. C. C. to Occupy New Quarters in Marlin-Rockwell Bldg.

After 20 years in one building, which the automobile industry has now outgrown, the National Automobile Chamber of Commerce will move on May 1 from "7 East 42d St., New York," which has been to the automobile industry what "26 Broadway" has been to the oil industry, to the new Marlin-Rockwell Building at Madison Ave. and 46th St.





**POWER!**  
O! Boy! but my car runs  
fine with the **ALSOP ALL-SPARK**—  
I have no more spark-  
plug troubles

Address reply to  
WAR DEPARTMENT.  
WASHINGTON, D. C.  
August 23, 1918.

DEPARTMENT OF MILITARY AERONAUTICS.

From: Ralph Earle, 2nd Lieut., A.S., S.C.

To: Materiel Branch, Supply Section, D. M. A.

Subject: Test of ignition devices.

1. Reference your memorandum of August 22nd, the six Alsop Ignition Devices per your order have been received and four of same have been installed.
2. The first device was installed August 20th on Ford car No. 28. The preliminary test consisted of using spark plugs with broken porcelains which had previously been discarded as worthless. By the use of the device the necessary spark was obtained through these heretofore useless plugs, enabling the engine to function perfectly with them.
3. The second test consisted of filling the crank case with twenty-four quarts of oil which filled same, the oil running out of the breathing pipes, and running the engine until all plugs were sooted to such an extent that all cylinders but one ceased to fire. The ignition device was then thrown in and within a distance of two city blocks all plugs began to fire and continued to do so throughout the test.
4. The other plugs were installed and are now in operation. No further special tests were made as the above was considered amply sufficient to demonstrate the efficiency of the devices.

*Ralph Earle*  
Ralph Earle  
2nd Lieut., A.S., S.C.

## THIS WONDER DEVICE

as one user says, "comes as near making the impossible happen as anything ever seen." The

## "ALSOP-ALL-SPARK" WILL PREVENT SPARK PLUG TROUBLES WE KNOW

- It will save fuel and spark plugs—
- It will fire dead carbon-choked plugs—
- It will cause perfect combustion—
- It will guarantee increase of gasoline mileage—
- It will do away with changing spark plugs—
- It will prevent running engine with a misfire—
- It will give a more powerful spark—
- It will eliminate carbon and vibration—
- It will increase speed and power—
- It will fortify any ignition system.

BUT DON'T TAKE OUR WORD FOR IT—

HERE IS A GOVERNMENT TEST. Read it and then send for our catalogue of Government Tests and Illustrated Information—or better still, send for a device, with money back guarantee. You can install it on any four cylinder car. IT WILL MAKE YOUR CAR RUN AND GIVE YOU A HOT FAT SPARK WHEN EVERYTHING ELSE FAILS. There are no dangerous exposed spark gaps which may set a car afire. **\$7.50**

**WE WANT LIVE DEALERS—LIVE DEALERS WANT THE ALL-SPARK.**

**ALL-SPARK IGNITION CO., Inc.**

13-D Water Street  
New York City

## Welding, Cutting and Brazing.

(Concluded from page 32)

less than  $\frac{1}{8}$  of an inch in diameter, for thin springs, nor less than  $\frac{3}{16}$  of an inch for the average automobile spring. If a smaller diameter filler is used, the average welder is pretty sure to burn the metal before it can be added to the weld. The light filler rod melts very quickly and almost in the next instant is turned to oxide. A large filler rod is also bad for obvious reasons.

The filler rod for the spring now discussed is made as follows: Fasten one end of a steel coil spring in a vise, then heat the first bend of it with the welding flame. As the spring turns red hot, the curve is straightened out by pulling on the coil. Each bend is heated and pulled until the coil spring is fairly straight; it need not be perfectly straight. Short spring rods may be welded together to make the desired length filler.

After making the filler rod, a scale deposit will be found on its surface. This is scraped and hammered until the clean metal is exposed. All of the scale is removed before the filler is ready to use.

When employing the filler, it is held very much as one would hold a pencil when writing—with the weight of it resting upon the junction of the thumb and first finger. In this position it is readily given a twisting motion by rolling it between thumb and finger, or it may be sawed back and forth, or raised and lowered in the weld as conditions warrant.

When welding springs, the operator should watch the filler rod about as closely as the melting groove. Just enough of it is melted to feed the molten part of the groove. If more is added, it will clog the weld and leave poorly-connected spots. The rod should not be allowed to rest motionless long in any part of the weld. In fact, it should be literally kept in constant motion, twisting and kneading it in the melting groove.

If it appears that not enough filler is being supplied, the welding flame is moved up and down half an inch or so of the rod in order to prepare it for quick melting when needed. If it seems to melt too fast, the flame is kept away from it as much as necessary.

The chief aim in the manipulation of the filler rod on spring welding is to add just enough fluid filler to a fluid part of the groove to fuse with it. The metals soak together very much like water soaks into the surface of the earth. And it is probably better for the average torch-welder to manipulate his flame to that end, rather than to try to force the two metals together by the power of the torch.

No flux is employed with this method of spring welding, since the condition and manipulation of the welding flame are all that are required to produce proper fusion.

After welding both sections of the

groove, the spring is ready for the next step which is variously called tempering, restoring, reheating, etc. It consists merely of reheating the weld and its near vicinity after the weld is finished.

The reheating may be done as soon as the weld reaches a normal color; that is, as soon as the redness of the welding heat disappears. However, it is probably better to allow the welded spring to get practically cold before reheating, since the welder may then turn it over without fear of warping it while examining and touching up the under side of the weld.

There are nearly always rough spots or poorly-connected spots on the under side of the weld which must be rewelded. Of course, if the welder is careful and works deftly, he can turn the spring over before it cools—just as soon as the groove is welded—in order to weld the defects in the lower side. But he should make arrangements to support the center or welded part while he is doing it, for the spring is liable to sag and spoil the alignment.

When the lower side of the weld has been doctored, the spring is placed on edge to cool again before tempering. This is done particularly where quite a number of broken leaves are to be welded, for while the operator is waiting for one to cool, he may be welding another. In this way, he can make the process continuous.

As soon as the spring is cold, or has reached its normal color, it is taken to the grinder. The grinding forms another important part of the spring-welding process as described here. The grinding should always be done lengthwise of the leaf and not sidewise. The action of the revolving emery wheel seems to influence the structure of the steel in such a way that the weld seems to be stronger where the grinding is done lengthwise. Fig. 3 clearly indicates the process of grinding.

When the weld has been ground smooth and flat, it is ready for the restoration process. But as has been said, it is not necessary to wait until the weld is cold before reheating, nor is it necessary to do the grinding before reheating. Both of these factors may be arranged to suit conditions. However, it will probably be more convenient to cool the spring before grinding, and to do the grinding before reheating. At any rate, when the spring is ready to heat again, it is once more wedged-up the same as for welding.

The welding flame is then circled around over the surface of the weld and over about an inch and a half of the leaf adjoining the weld. This section of the leaf is brought to a cherry red heat slowly. Then the flame is removed and the leaf permitted to cool while resting on its edge. This reheating process is for the purpose of softening any chilled or hard spots, and to toughen and strengthen the weld. The extent of the reheating is indicated in Fig. 4. When the reheat has subsided to normal, the leaf is ready to use.

## Special Lathe Devices.

(Concluded from page 23)

shafts, rods, etc. These can be purchased from the manufacturer in sizes suitable for the different sizes of shafts.

In Fig. 5, at *R*, is shown another case of irregular work that can be handled very nicely on the face-plate. A small bracket, *S*, formed at right angles can be made secure to the face-plate by means of the bolt, *T*, and the work held to the bracket, *S*, by a second bolt, *T*, which passes through the work, *R*. By loosening the lower bolt, the work can be moved up or down to reach an exact center, or it can be moved sideways if desired.

Referring to the special job shown in Fig. 6, we again have something different—a boring job requiring a still different fastening than the one just described. At *O* is a bolt passing through the upper end of the box and through the face-plate. This holds the work to the plate, but, of course, not held tightly enough but that it might be forced to either side with the cutting tool. Therefore, it will be necessary to contrive some sort of an arrangement to prevent the side motion.

If we bolt small lugs to the face-plate as shown at *P*, forcing them tightly against the work, the turning may be done without danger of its being forced to either side by the cutting tool while making the cut. This, however, is but a single suggestion, for there are many ways of doing this particular piece of work; for instance, a very good plan would be to turn the pointed noses of *P* up and thread a small cap screw into them, thus allowing them to bear against the work to be turned.

At *Y*, in Fig. 7, is a special piece of work which is held in place by small straps bolted to the face-plate. The straps, *Z*, should be sufficiently heavy to prevent springing, when the bolts are tightened, and allowing the work to crawl out at one side.

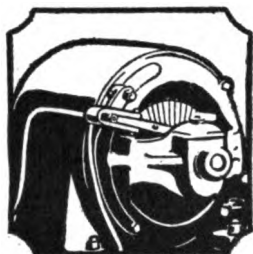
In Fig. 8 at *V* is something very unusual, yet it gives a good idea of how similar pieces may be held, from time to time. Two blocks held to the face-plate, *W*, make a suitable bearing for the work. The bolt, *W*, is of the eye-bolt type, slipping over the work at *U*, on either end. This work can be moved up or down, or sideways, to determine the desired center.

Selecting the lathe best suited to the shop is a problem that no doubt will confront many garagemen before long.

If the shop is being fitted up for small repair work, such as guns, sewing machines, etc., the lathe of the smaller pattern would be found to be the best to buy; while in the case of the garage, the larger ones, say from 13 inches to 15 inches, will answer very nicely and handle practically every piece of work.

If, however, you take into consideration the tractor and threshing-machine work from your territory, a larger lathe will be the better one to buy.

# A Sharp ? Snap !



# A Sudden ? Rush of Air !

## Seemingly Unimportant but Extremely Significant

ONE cannot observe a Usaco Air Compressor at work without being definitely convinced regarding its remarkable ability and general all 'round efficiency. Regardless of pressure requirement or severity of service, a Usaco compressor accomplishes its work quietly and without the slightest signs of labor or overheating.

After the motor stops pumping, having raised the tank pressure to the proper point, there is a **"sharp snap"**, followed by a **"sudden rush of air."**

It is the operation of the automatic pressure release, a Patented feature of Usaco units, the use of which has introduced a new standard of reliability not heretofore known in air compressors by eliminating a common cause of motor inefficiency.

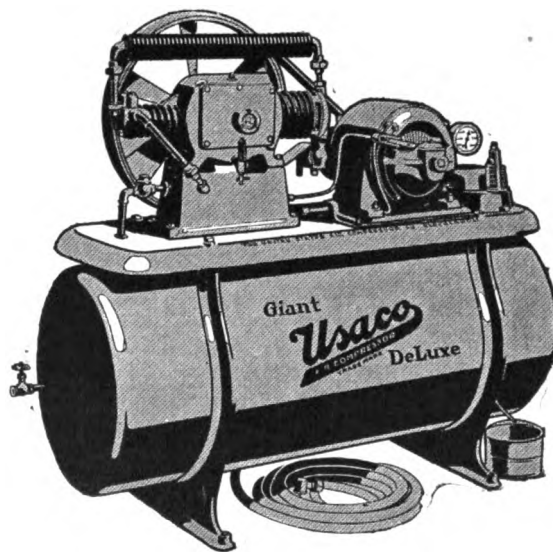
This is but one of numerous improvements and refinements incorporated in Usaco Two Stage Compressors as a result of many years of experience—desirable features which combine to produce units generally recognized as the most efficient in the world.

### The Usaco Standard De Luxe Compressor Capacity, 4 Cu. Ft. per Min.

Similar to the Giant, illustrated at right, is a completely automatic and self-contained unit of the very highest quality. It furnishes high pressure air suitable for tires of all sizes and pressures, in great volume and is quiet running and foolproof.

Also furnished, if desired, mounted on wheels to provide easy portability.

Inquiries desired regarding our plan of cooperating with Jobbers.



### The Usaco Giant De Luxe Compressor Capacity, 7 Cu. Ft. per Min.

This unit differs from the Standard De Luxe only in having greater compressing capacity, a more powerful motor and a tank with double the capacity of the Standard. Particularly adapted for the gruelling service encountered in inflating giant truck tires, a service which it handles with remarkable speed and ability.

Also furnished in portable type.

In writing for literature and prices mention the name of your Jobber.

## Two Stage

# Usaco

## Air Compressors

Manufactured by

## The United States Air Compressor Co.

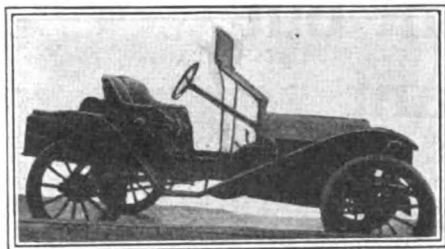
6542 Carnegie Ave. Cleveland, Ohio

Please send literature advertised  
in ..... to name written  
on margin. My jobber is.....

### Roadster Used for Ten Years Without Repairs Is Claim.

Ten years ago there landed in Lewiston, Me., a dinky little roadster that looked too small for either business or pleasure. It did not find a ready sale and was knocked off for an even \$600. But it probably has given more service on the investment than any other car in existence.

In these ten years, this car has been driven by one man, on its original gears,



**Operated for Ten Years Without Repairs.**

and with the same differential and other internal mechanism, working daily, summer and winter, traveling through Maine and carrying its owner about his business. He figures that 10,000 miles a year is a low estimate, so that the total mileage to date must be over 100,000 miles—and it is still in constant use.

Of course, there have been new shoes—although not often renewed—and valves, nuts and bolts. Once the original gears were taken out, fearing they were worn, but the new ones were stripped shortly afterward and now the original ones are working in the little roadster again.

This ten-year-old was recently honored by being chosen by a former mayor of the city as his daily conveyance from hospital to office, preferring the convenience of the low-riding roadster to the luxury of a big limousine. The owner expects to obtain still more service for his money out of this car, and when its usefulness is gone, he intends to give it a decent burial off some Maine cliff into the ocean depths.

### Police Say Use of Safety Devices Lessens Car Thefts.

The use of safety devices is given by the St. Louis police as one of the causes for a decrease of 45 per cent in motor car thefts for the first seven months of 1919 as compared with the same period of the preceding year.

Up to August 1, 835 motor cars were stolen, nearly all of which have been recovered. In the same period in 1918, 2,241 cars were stolen and 1,373 were recovered.

### Registration Fees to Be Allotted to Counties Collecting Them.

Registration fees in Nebraska for 1920 will total \$3,000,000. Of this 25 per cent is allotted to the county collecting the fee, which may be used as a road dragging fund on any county road.

The remainder goes to the state highway department, and is expended in the county from which it originally comes, the state department to direct the expenditure and then only on roads which are in the state system or have received federal aid.

### Farmer and Your Business. (Concluded from page 42)

believe that you are rendering a genuine service, it is your duty to carry the gospel of your service into the by-ways and hedges. This isn't sentimental bosh or mawkish idealism. It is a policy that pays. It is simply longheaded business sense.

And this leads me to what I really came here to say:

Business must look to the American farmer today, not only to feed it, not only to buy its wares, but actually to save it from destruction.

However optimistic we may be; however great our faith in the sanity and good sense of the American people, we cannot close our eyes to the state of unrest that prevails in the industrial world. We cannot deny that business in many respects has been arrogant, greedy, heartless; with the inevitable result that labor is more ready than we have ever known it to be to listen to the siren song of the impractical dreamer, or to be roused to passion by violent enemies of society. On the borders of every conflict between Capital and Labor, Revolt and Anarchy lurk, growing bolder with each new contest. Capital is alarmed as never before, and Labor, to a greater degree than ever, has lost confidence in the integrity and sense of justice of Capital. And despite temporary concessions and palliations, the breach widens. God only knows what the end will be unless Business speedily recognizes its fundamental responsibility to Labor as well as to the public it serves, and unless Labor sees that Labor can prosper and profit only as it renders service.

Between these two contending forces stands—what? Well, we say, "The Public." But what is the Public that you know? The men in this room, if we eliminated the few blooming millionaires among us, are fairly representative of "the public." What kind of a buffer would we make between Capital and Labor? Wouldn't we find ourselves naturally and inevitably in one class or the other? Haven't we all pretty well developed prejudices and deep-seated opinions?

The men in the street outside are "the public"; but there is a definite, sharply drawn line between them. There is no unbiased public in New York City or anywhere in our urban population. The one stabilizer, the one arbiter, is the American farmer, and it is to him and to his sound sense, his innate justice, his love of a fair deal, his patriotism, his steady industry, that we must look for our way out of disaster. If he falls behind in any of

these qualities, we drop farther back.

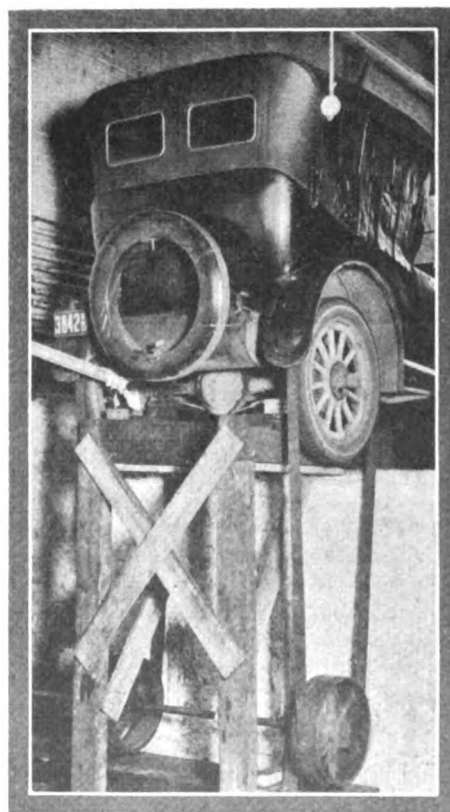
He is both capitalist and laborer, and yet he lives removed from the rancor of the strife that clouds our minds and benumbs our reason. He has never yet failed his country in its time of need. It was "the embattled farmers who fired the shot that was heard around the world," at the birth of our nation, and ever since, the farmer in war and in peace has been our independence and our safety.

### Machine Shop Solves Power Problems with Mitchell Car.

During the recent coal strike, when the lid was nailed down on factories using electric power, the G. M. Davis Regulator Co., of Chicago, solved the problem by running its plant for 12 days on power supplied by a Mitchell, Victory model, automobile.

The Davis company was working on reducing valves on government orders for marine installation and there was no time to lose in untangling the red tape surrounding a special application for coal.

After conference with the various shop foremen, the officials decided to take the Mitchell Victory, which the president of the company had been using, and connect it up, by placing belts around the rear



**Using Automobile for Transmitting Power.**

wheels, to the line shaft to drive the 220-volt generator.

The generator in the end not only supplied current for lighting, but also power for running the various milling, grinding, drilling, and automatic machinery throughout the factory.





# The COFFIELD TIRE PROTECTOR

*makes-*

**COFFIELD  
PROTECTOR**

*any tire wear longer*

**DEALERS Who Sell Them  
ARE Most Enthusiastic—as  
are those who use them**

Most Every Tire nowadays is well built and will give thousands of miles of wear IF—

You are fortunate enough not to damage the Tire by stone bruises, running flat from a puncture or something of the kind.

But how many tires have to be discarded because the fabric is damaged long before the tread is worn through to the breaker strip!

The "Coffield" Protector is not a cure-all and is not intended to be put in damaged or worn out tires. It is for use in NEW TIRES or TIRES THAT ARE SOUND. When used in this way the Coffield Protector will make any tire deliver one mile of service for every mile of wear there is in the tread, BECAUSE:

It prevents punctures,  
Eliminates Stone-Bruises,  
Reduces Blow-Outs to a minimum.

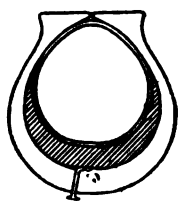
The "Coffield" Protector is made of pure, live rubber—has no fabric of any kind in it—and fits inside the tire like a glove. There is positively no friction and it is a protection both to the inner tube and the casing.

The first cost is the only cost, because the "Coffield" is used over and over again. Put it in a new tire—wear the tire out—then put it in a new tire again. It will save its cost on the first tire you put it in by the extra wear it causes the tire to give—saying nothing about the trouble saved from punctures and blow-outs. One set of "Coffields" will outlast all the tires ever used on any car.

**ACTIVE DEALERS  
Wanted for Open  
Territory**



The nail goes thru the outer casing.



But the live rubber of the Coffield Protector (having no fabric) merely gives when the nail strikes it—and the nail clinches between the Protector and the casing.



Stones and other obstacles will not bruise a casing equipped with the Coffield Tire Protector—as the blow is distributed and absorbed by the entire casing rather than any one spot.

**The Coffield Tire Protector Co.  
Dayton, Ohio**

**CLIP AND USE THIS COUPON**  
**THE COFFIELD TIRE PROTECTOR CO.,**  
 31 Court St., Dayton, Ohio.  
 Please send us, without any obligation, your proposition to  
 DEALERS—  
 Name .....  
 Address .....

### From \$25 to \$60,000 in Three Years.

(Continued from page 13.)

never give a customer a chance to get sore. Give him something free first and, above all, have him make his kicks personally. Give him some free work if he has paid a bill and some few little things are not right. Then make the customer admit that the work is right. If customers don't kick and criticize, we get into a rut and think ourselves perfect. By our mistakes we learn and profit, but there is no reason why the customer should pay for them.

"I also believe in taking the attitude of the customer—feel with him concerning any repair work and suggest what you would do if it were your machine, and take no work under the amount required for satisfaction.

"This instills confidence, for the average automobile owner realizes that he knows very little about a car. Once you have gained his confidence, he will come and say: 'Fix it! I don't know what's wrong with it.' Besides, I find that it builds up good will to call the owner up concerning any replacement parts—particularly if they cost considerably—even if the repair order gives me power to replace any part without consulting the owner."

"Concerning charges, Mr. Morgan, how do they compare with those of your competitors in town?"

"For most of our work we charge a little more, but I have found that it is best to do the work right, charge for it, and guarantee it. Then if the work does not stand up, replace it free of charge.

"It has paid me—and the customers are my friends. If they think the amount I estimate for the work is too high, I have no chance of losing my reputation by doing inferior work at a cheaper price. For example, in my locality, about two years ago I happened to be the only one who could weld the windshield on a Dodge car to prevent it from rattling, and do it without burning the paint. But for this work, I charged \$5 a side, or \$10 for both.

"One day a customer came in and wanted to have his windshield repaired. I told him it would cost him \$10, but that I would guarantee not to burn the paint. I had finished one side when he decided it was too high a price. I told him he could go somewhere else and made no charge for the work I did.

"Several weeks later he came back

for some minor repairs and I noticed that one side of his car at the windshield was burned. I said nothing. Finally he asked me if I would weld one side of his windshield which he had had repaired, but which became loose. I told him it would cost him \$5 and he said: 'Go ahead. When I could have had it repaired right, I thought—like a d—n fool—that it was too much, but now it will cost me twice as much.'

"Just as I believe in charging for doing good work, so also I believe in paying higher wages in order to get the best mechanics. I pay my men more money than any other place in town, and select only those men who are interested in the business, who pull with me, and to whom a mistake means just as much as to their employer, and who strive just as hard to rectify it. I do not believe in hiring apprentices and training them. Consequently in my shop you will find every man a first class mechanic.

"In connection with my work at the Pierce-Arrow plant I had some experiences which I now find of great assistance in selecting men for work in the shop.

"As an engine assembler I, with an assistant, was supposed to put together six engines a week. We were very hard workers, and quick, and easily managed to assemble the six engines in five days or even less. Then



Service of a Very Unique Kind Is Being Given to Automobile Owners in Toronto, Canada, in the Form of an Automobile Laundry—This Service Is Given for a Certain Price per Car or on Contract Prices—In Connection With This Service They Also Sell Tires, Gasoline, and Such Necessities as Greases, Lubricating Oils, Top Dressings, Etc.

we would spend the rest of the week in the other departments observing and becoming acquainted with the work.

"Feeling, however, that we could be of more value to the company by assembling more cars, I went to the foreman and told him we would assemble eight engines a week, providing our wages would be increased. The foreman promised us the increase, and so we set about accomplishing the task.

"We had no trouble assembling the eight engines a week and as a result of this we were advanced; I received an appointment as foreman of another department.

"The men in the department could not understand how we were able to do it. They worked just as hard, but it's quickness that counts. So that is the characteristic I look for when I hire a man for the shop.

"I also believe in being on equal terms with all of my men. I call them by their first names, and they call me by mine. In this way they are made to feel that they are a part of the organization and free to say what they think, and they are not afraid to make kicks.

"To further foster and promote this feeling of co-operation, we have beach parties every summer and in the winter a get-together dinner. These are always very informal affairs."

In connection with the actual doing of the work, Mr. Morgan believes in specializing; in using the best equipment, and special tools and devices for doing the work accurately, quickly, and efficiently. He enforces system, schedule time, rigid inspection, and standardization.

An incident, which occurred in 1918 when there was a shortage of material, further throws light on the characteristics which have made Mr. Morgan a success in his business.

"At that time," said he, "it was very hard to get fenders from the manufacturers of the Dodge car and, as a result, they were at a premium. One day I happened to be driving along in my car when I spied the junk heap of a local Dodge agency piled with from 300 to 500 fenders in all kinds of condition.

"Reaching the shop, I immediately sent two men with the service truck for the fenders. When they returned I found that most of these fenders had only a few dents and were rusty.

(Concluded on page 52.)

# Oro

**GOOD as GOLD**

## —the Good Connecting Rod!



**Made of  
the very finest  
steel—drop forged!**

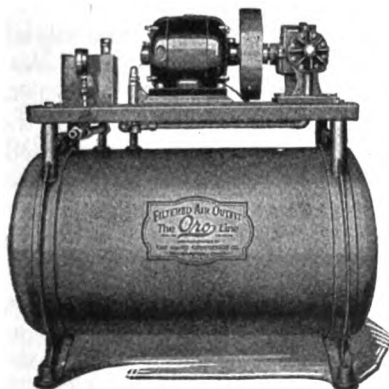
**A** CONNECTING Rod for Ford Cars that is made as you wish it made—sturdy, reliable, long-lived. This rod will stand up as long as the car—eliminating all necessity for tinkering with the “underneath” part of the engine. The steel used is 30 to 40 point carbon, perfect in quality and drop forged. The bab-bitt is a scientific combination which gives unusual satisfaction.

This Connecting Rod, although much better than other rods, costs less than most of the others. It is economical to buy—economical to use.

The ORO Connecting Rods have been in use for many years—under all conditions—and they have proved every claim we make for them. Dealers prefer them—owners demand them. They realize the connecting rod is such an important part of an engine that only the very best quality will do.

*Write us for information. We'll tell you about the ORO Connecting Rods—and also about our large line of superior automobile accessories.*

## We Also Manufacture “Oro” Filtered Air Outfits!



The ORO Filtered Air Compressor Outfit provides a perfect source of air—day and night—without attention from you—air that is absolutely free of oil, dust and dirt. It's a business builder—a business holder. We manufacture Au-To Air Compressors for all garages, large and small. Ask for facts about the entire line.

## The Au-To Compressor Company

304 S. Mulberry Street

Wilmington, Ohio

### Condition of Workman.

(Concluded from page 20)

the workman, compare his act to that of an able-bodied man, and adjudge his case upon this basis. The insurance carrier argues that since the lifting of a 40-pound weight could not have affected an able-bodied man, that the injury was due to the impaired physical condition of the workman and not to any incident of the employment of such a wrongful nature as to hold them liable.

"Compensation is not necessarily barred merely because the workman's impaired physical condition at the time rendered him more susceptible to injury than a normally healthy man. One authority has said: 'Where a claimant under the law was, at the time of accidental injury, capable of performing the labor of an able-bodied man, pre-existing conditions are not successfully plead in bar of compensation.'

"To all intents and purposes, Frisbe was capable of performing the work of an able-bodied person in the character of the employment in which he was engaged. The employer admits that he did not require Frisbe to do heavy work because he thought it was 'too hard on him.'

"The final question, then, is: Did the fact that Frisbe was incapacitated while doing his ordinary work in the ordinary way to relieve the employer, and, through him, the insurance company of liability?

"We feel that it did. Again we quote from the authorities: 'No com-

pensation is recoverable in respect to an incapacity primarily caused by a disease or the impaired physical condition of a workman at a time when he is doing his ordinary work in the ordinary way.'

"Pre-existing condition, nine times out of ten, cannot be taken into consideration by the employer. In the one case where it can, such as this one, the employer is relieved where the workman was doing his ordinary work in the ordinary way. It is unfortunate for the dependent that the law so stands."

### Garage One Thing After Another.

(Concluded from page 17)

You see, he figgers it out that if everything is always where you know it ought to be and you can find it right away, then you don't have to wait any time hunting for it and a feller can do his work quicker and you don't have to have so many men and that makes the business pay better and you can do more jobs and that's a pretty good thing nowadays. He says so.

Why if I was always leaving my tire gauge around that I use out in front helping fokes blow up their tires, I'd never know where to find it because some other guy would carry it off and

And speaking of helping fokes get air in their tires, the boss said to me "Nix on the tips, see?" I'm paying you your wages myself and I'm putting free air out there to get fokes to stop and use it so they'll come to my garage. Free air means free air that's free and if I want to supply em with

your services free too, that's my business, ain't it? You shouldn't worry. Most fokes don't need any help anyway, but you help em if they need it and believe me, it's free!"

And he says something else that maybe it wouldn't hurt any for you to know in the drug business, Pete. He says, "William, smile at em. Fokes don't give a darn to be frowned at. They like smiles. Be polite and say good morning."

But say, the boss himself ain't such a smiler. Gee! He says he ain't. Well, maybe he don't have to smile. He's got me to do it for him. I suppose somebody has to be the terrible living example at that.

When you make up your mind to smile you just get kind of into the habit of it and you smile before you think. Why I've caught myself smiling when I pump up some gas and had an awful toothache and he says that's going some, but nobody cares anything about your toothache and they like the smile, so let her ake. I'm that way.

Yours till Niagara falls.

BILL.

### From \$25 to \$60,000 in Three Years.

(Concluded from page 50)

So men were assigned to straighten and clean them, after which they were sent away to be enameled.

"When they returned from the paint shop, they could not be told from new ones and cost 40 per cent less.

"Some people said it was bad business—that there was no money in it—but I managed to sell them in a short time and at a good margin of profit."

As in this case, Mr. Morgan is always on the alert and takes advantage of every possible chance of salvage. He does not believe in "Watch the pennies, and the dollars will take care of themselves," but says, "Watch the dollars, the deuce with the pennies."

While we have narrated the story of how Mr. Morgan succeeded in the repair business and the policy to which he attributes his success, no details have been given concerning the methods used in the operation and management of the repair shop. These will be explained fully next month and will contain so much which is of value and interest to every garageman that no one should miss them. In many respects his methods will be a departure from existing methods in shop management not only from the repair end, but from the business end as well.



Here is a Well-Arranged, Modern Garage and Supply Salesroom—The Building is Built Entirely of Brick; the Front is of Buff Cream With Green Colored Trimmings—It Has a Capacity of 20 Cars—Notice the Large Salesroom, the Filling Stations, the Portable Oil Tanks and the Free Air Station—Typical Arrangement for Serving Patrons With the Least Amount of Trouble and Time—Neatness is an Outstanding Feature of This Service Station and the One Thing That All Garagemen Should Strive to Attain for Their Place.



# Passed Highest in Every Official State Test

## Prices

3 1/4 inch and smaller . . . \$2.75  
 3 3/8 inch and larger . . . 3.50

Slightly higher west of Denver and in Canada



## Why Motorists Buy the Shaler Lens

### It Stops All Glare

Because the light is directed below the level of the headlamps.

### It Improves the Driving Light

Because the distance light is more concentrated than with plain glass and full width of road is lighted.

### It Protects the User Against the Glaring Lights He Meets

Because the waste, or glare rays, are focused on the edges of the road, giving the effect of a pair of spotlights in addition to regular headlamps.

### It Penetrates Fog and Dust

Because the light rays are held down close to the road so that they are not reflected back to blind the driver.

### These Are Some of the Reasons

Why the Shaler is outselling all other makes of lenses in the limited territory that we have been able to supply up to the last few months, and why Jobbers, Dealers, Motorists and Car Manufacturers unite in approving it.

## SHALER ROADLIGHTER

Four states, California, Connecticut, New York and Pennsylvania, have adopted the standard A.A.A. anti-glare law which will eventually become universal. This excellent law requires light that is safe to drive behind as well as safe to meet.

Each state tested practically all lenses to find out what candlepower bulbs could be used without glaring. The Shaler passed highest every time. With any lens, the greater the candle power of the bulb, the better the driving light.

A lens is technically "legal"—even if the tests prohibit it except with very weak bulbs and with headlamps tilted down. But the Shaler is the only lens that may be used in every state with the maximum candlepower bulbs and with headlamps level. Like the famous Shaler Vulcanizers, it is in a class alone.

No accessory has ever had such unanimous official approval.

**Dealers:** Write for special demonstrating offer. Be your own judge.

C. A. SHALER CO.

372 Fourth St.  
 WAUPUN, WISCONSIN

# Equipment Increases Service Demands

There Is No Surer Way of Getting New Business Than by Giving Service—  
Service Depends on Proper Equipment—Ignition and Starting Systems  
Are Common Sources of Trouble—A Test-Bench for Handling This Work

By Arthur W. Park

This article is going to be about spring business. And it is going to be about a particular sort of spring business—business of a sort which is neglected for the most part nowadays because a majority of garage and service men have not the facilities with which to care for it.

In addition, this article is going to deal with one of the best repeat-businesses I know—that of accurately testing motors, generators, and magnetos.

The point I am trying to make is this: There is no surer way of getting new business than by giving service, and there is no way this new business can be held except by giving better service than the other fellow.

There was exhibited, however, at the New York and the Chicago show, apparatus of a number of types which will go a long way toward eliminating this difficulty. One machine in particular, made by Becker Brothers of Chicago, was a test-bench for the testing of starting motors, magnetos and dynamos which proved particularly attractive. This test-bench, I understand, is one of a number of articles in this line of equipment being brought out by Becker Brothers.

The test-bench I refer to was the first one I ever saw that I thought filled the bill. With one like it in his possession, the enterprising garageman would be enabled to launch an advertising campaign that would bring in business probably quicker than he could handle it.

Everyone is anxious to know whether his generator is generating the proper amount of current. To discover this is a long, costly, and arduous process in a majority of the garages within the writer's experience. Everybody is anxious to know whether his starter is producing the proper

pull, and whether it is "eating" up more of the battery current than it should. A magneto test is one of the most common requests around the repair shop.

The difficulty in the past has been that if this work were to be done satisfactorily, the services of an expert, and, therefore, expensive repairman, had to be obtained.

In addition, it was necessary to buy costly apparatus, with the result that when the

facturers themselves—or a test-bench manufactured by them for testing their own equipment only.

With the outfit of which I speak, a photograph of which is reproduced on these pages, it is possible to make a complete and accurate test of any magneto, generator or starting motor of any size, shape or make, either of 6 or 12 volts, in five to ten minutes. No expert knowledge is required for operation.

Ordinary automobile mechanics who saw the exhibit at the show learned to operate it in half an hour. Only one adjustment was required to begin the test, whereas many adjustments—and delicate ones, too—are made in the manufacturers' laboratories before their engineers can even think of beginning work.

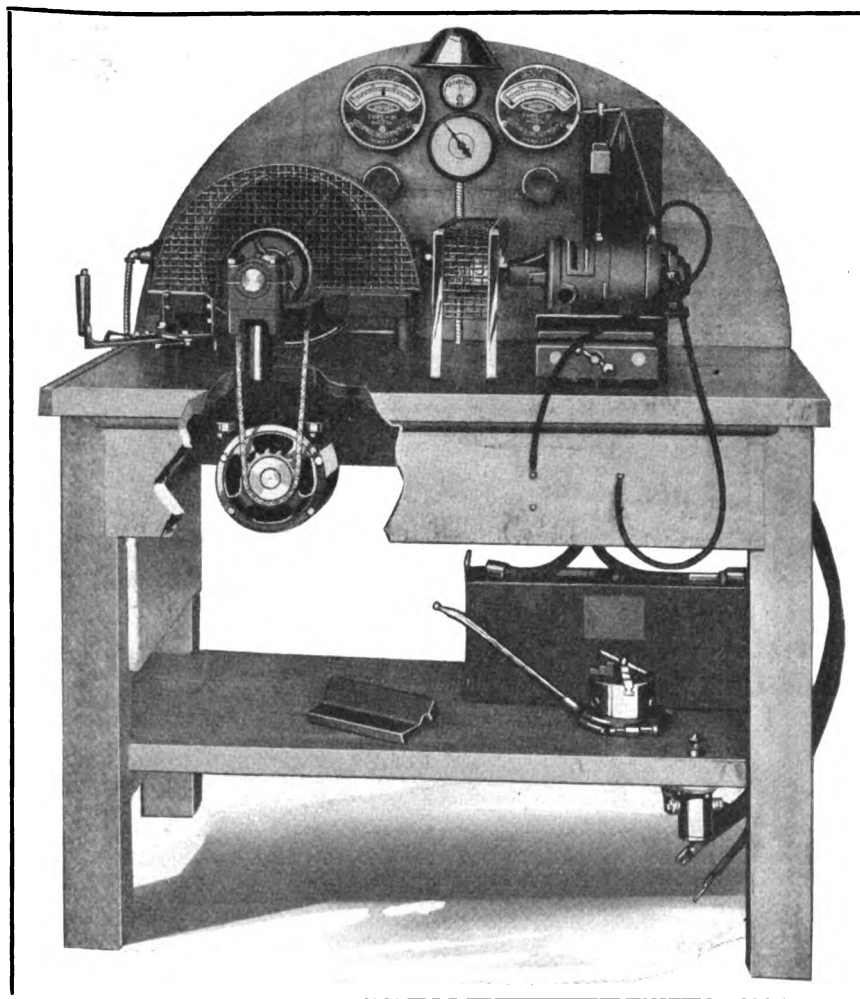
The patented universal vise, which is one of the features of the bench, would fit an egg-shaped generator or motor if there were such a thing. Two universal three-jaw chucks are supplied with the bench. Either will fit any motor or generator shaft.

For testing motors, one of the chucks is equipped with a prony brake. This shows—on a detachable scale which is part of the equipment—the power of the starting motor in foot-pounds.

Any desired r.p.m. for the testing of generators and magnetos

is obtained by a friction-drive transmission which gives any desired speed, either forward or reverse.

A Van Sicklen tachometer enables the operator to gage the speed accurately. An ammeter reading from 0 to 25 both ways is provided for testing the generators and an ammeter reading from 0 to 600 is provided for testing the starting motors. Power for the testing of generators and magnetos is provided by a 2 h. p. motor.

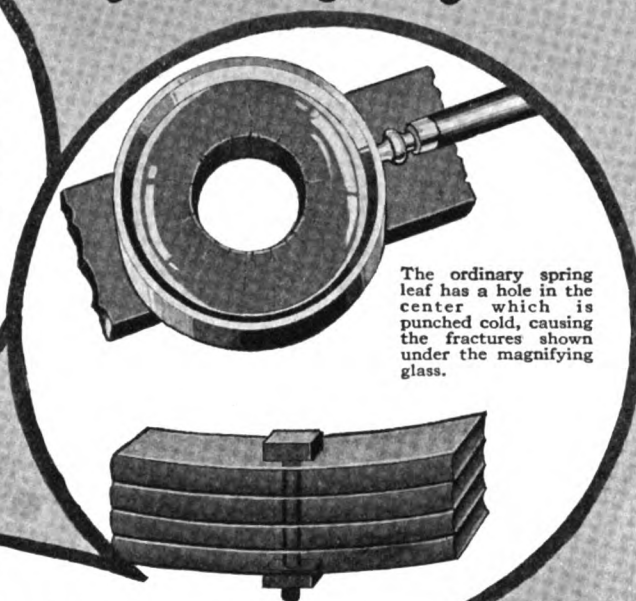
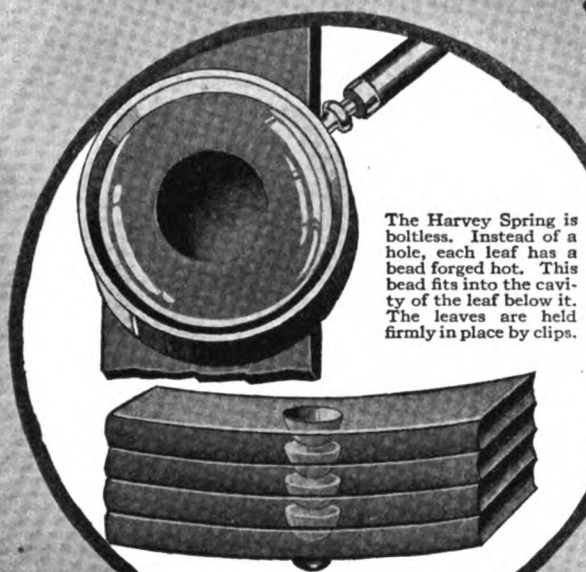


Test-Bench for the Testing of Starting Motors, Magnets and Dynamos.

tests were made, they were not always reliable, but they were always expensive, and left a sore spot in the mind and pocket-book of the customer.

So far as I know, the machine exhibited at the Chicago show is the first that really "qualifies." I never saw one before which was fitted to test any type of motor or generator and equipped to discover trouble of any kind and all of it, outside of the elaborate testing laboratories of the manu-

# Why the Harvey is Practically Unbreakable — and Why Most Springs Break



**T**HE Harvey Boltless Spring has *no weak spots*. It is just as strong at the center as it is anywhere else. No metal has been removed at the center, no fractures made—the fibre of the steel is unbroken.

This feature, with that of the special Harvey process of heat treating and tempering each leaf accurately and uniformly, gives the Harvey Spring unsurpassed strength and resilience.

Thus the Harvey dealer is amply protected—every Harvey Spring is guaranteed against breakage or sagging.

The ordinary spring has a weak spot where the hole is punched to accommodate a bolt. Such a spring needs but a little added strain to induce one of the minute fractures starting at the hole to extend and enlarge to the full width of the leaf.

*Harvey dealers are aided by a generous supply of sales helps, movie slides, window decalcomanias, inside wall posters and the helpful Harvey book containing specifications for more than 1500 Harvey springs. Write for this book now.*

**Harvey Spring & Forging Co.**  
1043 17th St. Racine, Wis.

Easy  
Riding  
Guaranteed



**BOLTLESS  
AUTOMOBILE  
SPRINGS**

# Facts and Ideas for the Tire Dealer

## Concrete in the Tire Business.

By FRANK E. MORRIS.

*Mgr. Quick Tire Service Co., Dallas, Tex.*

Dear Ed:

Nature was the original worker in the concrete business, and if you don't believe it just examine a few human heads, if there is any human beings in the place where you are.

When I was in baseball Ed, and finally reached the pinnacle of being called the greatest pitcher of all times, I had gone through a lot, and naturally had runned across a whole bunch of ivory on the ball lot.

The ivory is in the tire business too, but we call it concrete.

The reason I claim that nature started the concrete business is that them who builds bridges, them who builds buildings, and others who builds things of concrete, would have you understand they originated the concrete business.

Ship builders have claimed it, and now comes along some guy which says they will build automobiles of concrete. No doubt he will try to cribbage the honor of being the originator.

So I have put you wise to it.

Now then Ed. I don't claim to make the discovery, but I think they oughtta make automobile tires of concrete, to match the heads of them guys which has allowed the matter of adjustment of tires to stand so long, without a howl.

Ninety-nine per cent of the tires that are brought to a dealer for adjustment are absolutely abused tires that are suffering from rim cut, stone bruises or fractures, sidewall breakage due to running practically flat, and a thousand other ills that fabric and rubber cannot withstand, and was never made to withstand.

At that any of these troubles would have occurred to old man Atlas when he was holding the world on his shoulders if some guy hadda put just one more straw on his back. And you know Ed. it was just one more straw which was what busted the camel's back.

Now why is it Ed. that all of the tire companies don't get together and say: "we will make no more adjustments," or else say: "we will give for the price of one tire, two tires, or a tire and a half, or maybe a tire and a third."

The public don't know, or won't tell what has happened to its automobile tire when it comes in for an adjustment, and many and many a man and a woman has been called a deep-dyed, double-dealing liar by the silent witness, their own casing, which they have offered for adjustment, and

which can't say a word and don't have to, because the disease it suffers from is written all over it; and like a step-child the abuse it has been subjected to by the step-parent shows all over.

An experienced tire man, who has adjusted thousands of tires has a big catalogue Ed, in which he has written a lot of things, and he calls it: "Fifty Million Different Kinds of Lies."

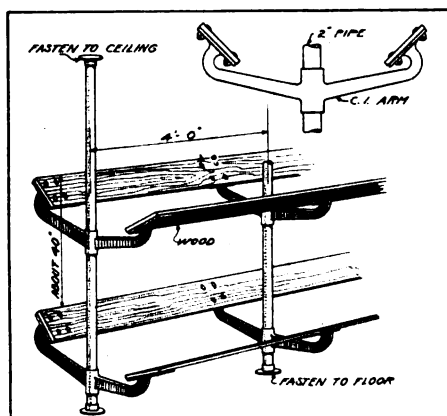
Yours, JACK.

## Tire Rack.

It is not always very practicable to make a tire rack entirely of iron pipes. A very simple semi-pipe tire rack can be made as shown in the accompanying sketch.

The vertical piece should be made of two-inch pipe and should be fastened to the floor and ceiling by means of one part of a two-inch flange union.

The cross arms can be bought or made



Simple and Easily Constructed Tire Rack.

up from pipe fittings, while the cross pieces should be of wood. The distance from center of cross arm to edge should be about nine or ten inches, and that between supports from four to five feet.

## Examine Inside of Inner Tube.

Although the examination of the inside of a tube is seemingly impossible, it can be easily performed and should always be done before a tube is put into a tire.

Lay the tube flat upon an even surface. Run the thumb and forefinger along the flat surface. If any lumps, or a series of corrugations are felt, you may know that there is an uneven wall thickness, strength where it is thick and weakness where it is thin. Such an inner tube is a danger to an expensive casing as the tube is no stronger than the weakest portion of it. One of the thin sections is liable to give way and cause a blowout which will permanently injure the casing.

## Lower Temperatures Beneficial, Rather Than Harmful to Tires.

In one particular at least, the cost of keeping up a car is less in winter than in summer, for automobile tires wear better and last longer in the cold winter months than they do during the warm, summer weather.

In recent tests conducted by the United States Tire Co. it has been demonstrated that the lower temperatures have a beneficial effect on tires, and records show that tires give much greater mileages in winter than in summer. Heat, especially frictional heat, is one of the worst enemies that a tire is called on to withstand. Cold air, dissipating this heat, makes it possible for a tire to last longer in spite of the extra pounding it gets when snow and ice are on the ground.

This rule applies, of course, where the tire is confronted only with the ordinary bad road conditions growing out of snow and ice and frozen highways. However, where a motorist must drive a car over rough roads, deeply cut with ruts, winter presents a decidedly different problem and only the most careful driving will make it possible for him to get a full return on his tire investment.

## Tire Repair School Conducted by Miller Tire & Rubber Co.

In anticipation of the time when it will be as necessary for the tire repairman to produce proof of training and study, as it is for a dentist or doctor to show evidence of having completed the prescribed courses, a few repair schools are being operated.

Among these is that of the Miller Tire & Rubber Co., manufacturer of geared-to-the-road tires. This institution averages 35 graduates a month. Each graduate receives a diploma certifying that he has finished the regular course of instruction consisting of lectures, text-book work, and practical repair work. Repair stocks, fabrics of all descriptions, air bags, vulcanizing machines and methods, and common sources of tire trouble, are among the subjects taken up.

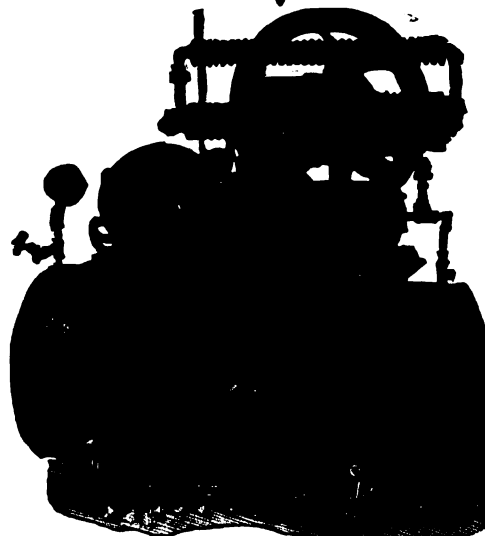
## Removing Air from Tube.

Frequent removal of the core of an air valve will generally impair the holding ability of the small rubber washer. A small screw having a groove lengthwise on one side and threads to fit the inner part of the valve may be run down so as to press on the core and keep the valve open until the air can escape without its being necessary to remove the core.—E. S., N. Y.





# The Spring Rush is Rapidly Approaching



"VICTORY" Complete Automatic  
Motor Drive Unit

ARE you facing the busy season with an inadequate or antiquated air equipment? If you are anticipating a really big year it will be well worth your while to have a first-class modern free air outfit.

Your air service is your first point of contact with the motorists of your locality. If the service is prompt and dependable, a favorable impression is made. Accordingly an air service of the right sort is a big factor in attracting business.

THE COMPLETE AUTOMATIC COMPRESSOR UNIT shown on this page is a GLOBE TYPE B, the original TWO-STAGE garage Compressor. There have appeared numerous deceptive imitations, but never an equal.

Globe Air Compressors meet the most exacting requirements of garage service, including inflating of the LARGEST PNEUMATIC Truck Tires, for which they provide ample pressure and capacity.

Low operating cost, dependable service and great durability have always characterized Globe Compressors.

Write Department A-G for bulletins

# GLOBE MFG. CO.

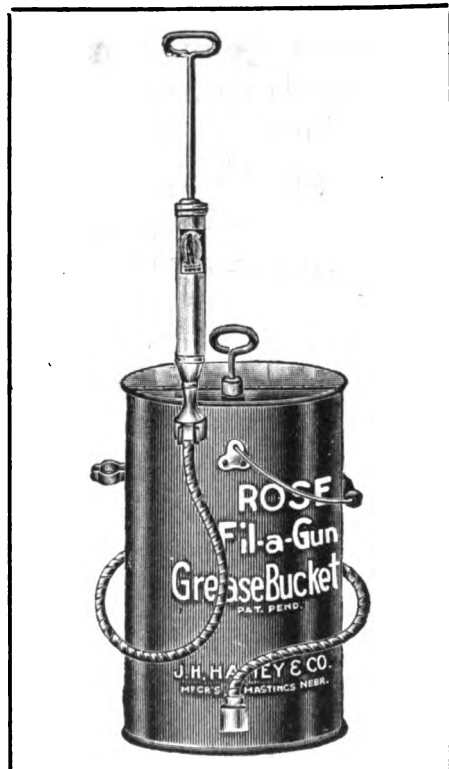
BATTLE CREEK MICHIGAN, U. S. A.

# Garage Equipment for Better Efficiency

## Grease Bucket Embodying Special Features Placed on Market.

The grease bucket placed on the market by the Frank Rose Mfg. Co., formerly J. H. Haney & Co., Hastings, Neb., has a new feature not found on any other device of its kind on the market.

Attached to the side of the bucket on a special carrier is a Rose topper nozzle grease gun which can be placed on the spe-



Grease Bucket With New Features.

cial hose nozzle and filled completely full with a single stroke of the bucket pump.

The gun is used to lubricate universal joints, cam-gear cases, etc., that cannot be lubricated with the hose. The bucket also pumps direct to the gear set and rear axle assembly through the hose.

Further information and descriptive literature can be obtained from the Frank Rose Mfg. Co., Hastings, Neb. Mention the American Garage & Auto Dealer when you write.

## Complete Line of Shop Equipment Produced by Manley Mfg. Co.

The garage and shop equipment manufactured by the Manley Mfg. Co. includes many indispensable factors for the modern garage repair shop and service station. The time of the strong-arm, sledge-hammer methods is past, for the car owner insists on intelligent, careful, and accurate work in the repairing of his machine.

Every garage—no matter how small or

how large—must have press equipment to keep pace with its only competitors; and to be successful and satisfactory, the presses must be suitable for automotive repair work.

Manley presses have been designed and developed especially for automobile repair work. They are of the screw type, with a capacity of 22 tons. For powerful pressure, steadiness of operation, simplicity and strength, there is said to be nothing to compare with the screw-type press. Its line of presses, the company says, permits the repairman to select the size of press which meets the requirements of his class of work to the best advantage and at a corresponding price.

Not only does the company manufacture presses to meet every need, but it also produces portable floor cranes with the necessary requirements of high lift, deep overhang, low base, strength, sufficient lifting capacity, combined with a lightness of weight; general utility cranes for inside work and outside wrecking, lifting and towing; engine stands for automobile, marine and airplane motors; portable work benches for light and heavy work; and oil services with and without hose.

Trade prices, a complete descriptive catalog and full particulars concerning these products will be sent to those who write to the Manley Mfg. Co., York, Pa., mentioning the American Garage & Auto Dealer.

## Service Products Co. Produces New Shop Equipment.

The Service Products Co. has placed on the market its Springfield high-rate discharge instrument consisting of a special voltmeter. The voltmeter is mounted on two steel posts which terminate in a convenient handle. Between these posts the current is short-circuited through a fixed resistance which determines the rate of discharge.

The company is also manufacturing a burning-in and running-in machine which possesses the advantage of either burning-in or running-in the Fordson tractor and the model T Ford engine, as well as running-in practically any of the popular car motors. However, only motors furnished with detachable heads can be burnt-in on this machine. The convenient working height, and the speed with which work is accomplished, are distinctive features.

In addition to these products, the company is manufacturing an electric test unit designed for testing starting, lighting, and ignition equipment as furnished to the automotive trade. It tests starting motors, generators, magnetos, ignition distributors, coils, relays, ammeters and switches. Its

distinctiveness in appearance and simplicity in design will appeal to the trade.

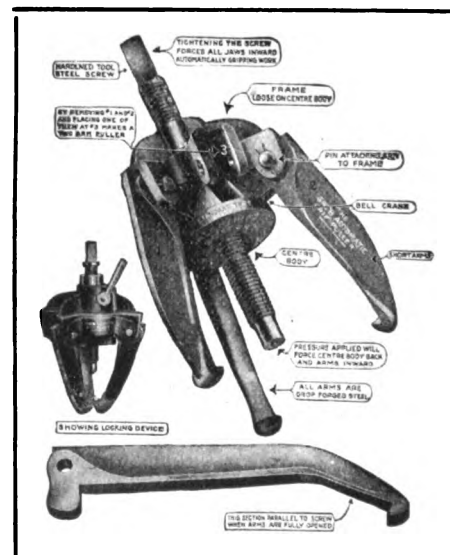
Descriptive literature and trade prices will be given to those writing the Service Products Co., Springfield, Ohio, mentioning the American Garage & Auto Dealer.

## Pullers, Bearings, Race and Gear Attachments for Shop.

The Greb Co., Inc., is introducing to the automotive trade, garages, repair shops, service stations and manufacturers a much-needed size of automatic grip puller to be known as the No. 3 Intermediate Greb automatic grip puller and also the Greb bearing, race and gear attachments.

The No. 3 Intermediate is designed to pull the average motor gears, such as timing, pinion, transmission, differential, and crankshaft gears, cardan and universal joints, pulleys and for general work. The capacity is 1 to 12 ins.; complete with two sets of jaws, 5-in. jaws open to 8 ins.; and 9½-in. jaws to 12 ins.; screw is made of hardened steel, ¾-in. diameter, 10 ins. long.

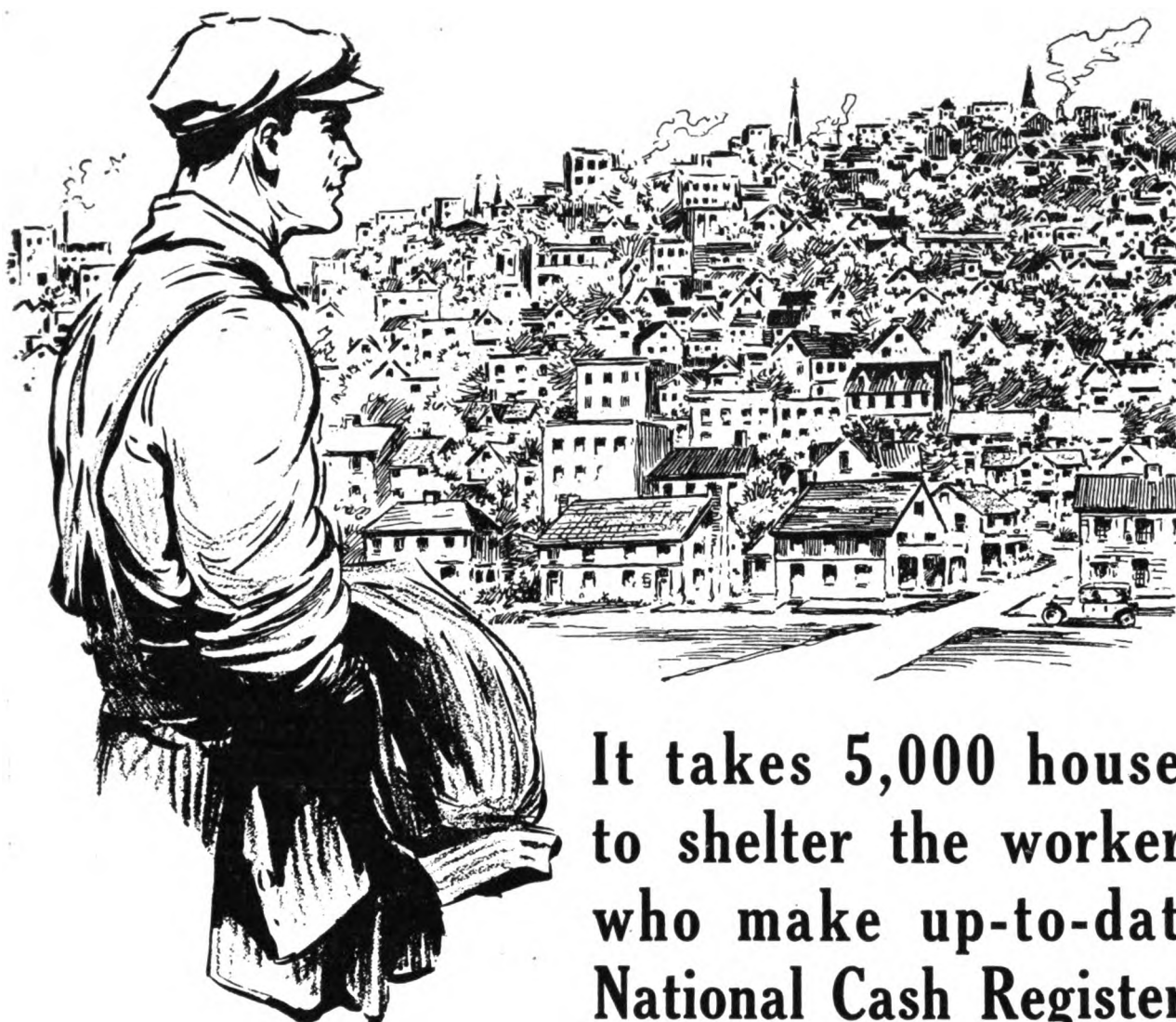
The Greb bearing and race attachment for No. 2 puller has a knife edge and can be forced behind the magneto, electrical generator, and self-starter bearings and races where it is impossible for the jaws of any puller to be attached. This attachment, when used back of small gears and



Special Attachments for the Shop.

bearings, not only saves them but the ends of the puller jaws as well. The capacity of the bearings and races is up to and including two inches.

The Greb Co., Inc., 172-173 State St., Boston, Mass., is the manufacturer of the products. Trade prices and further particulars will be sent to those writing to the company, mentioning the American Garage & Auto Dealer.



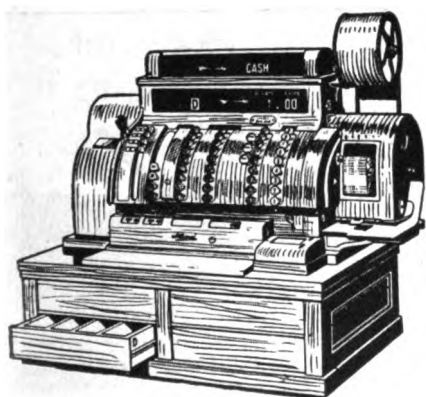
## It takes 5,000 houses to shelter the workers who make up-to-date National Cash Registers

**T**HESE 5,000 houses are the homes of more than 25,000 people — a city in itself.

They are good homes, too, because the workers at the N. C. R. factory are intelligent, skilled mechanics who are able to demand exceptionally good living conditions.

The factory in which they work comprises 21 modern buildings, providing over 40 acres of floor space.

It has taken 35 years of the hardest kind of work to develop this tremendous organization — an organization engaged solely in the manufacture of labor-saving machines that help merchants all over the world.

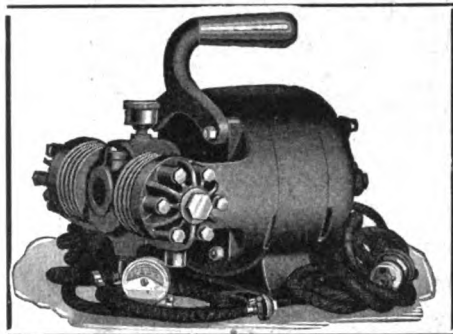


The National Cash Register Company  
Dayton, Ohio  
Offices in all the principal cities of the world

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

### Small Size Air Compressor Suitable for Garage Service.

There are ten definite reasons given as to why garages, accessory shops, hardware stores, and all concerns selling anything



Air Compressor for Garage Service.

used in connection with the motor car have found the No. 10 Oro automobile air compressor of the Au-To Compressor Co. of practical value. They are:

1. It is small and compact.
2. Weighs only 35 pounds, can be carried anywhere.
3. Is attached directly to the shaft of a  $\frac{1}{4}$ -horsepower motor, insuring low operating expense.
4. Is connected by simply screwing the plug into an electric lamp socket.
5. Gives pressure up to 100 pounds and supplies 2.61 cubic feet of air per minute.
6. Runs at a speed of 1,700 r. p. m. and furnishes a continuous supply of air.
7. Air is free from oil or grease.
8. Device can be used in public and private garages for painting.
9. Can be used for spraying.
10. Is furnished complete with motor, cable, gage and connections.

Everyone who sees this little outfit expresses wonder at its remarkable efficiency and almost unbelievable durability.

The complete line of Oro products to which has been added adjustable wrenches and pliers, spark-plugs and cylinder-head wrenches for the Ford car, is described in an attractive catalog which will be sent to those who are interested. Address the Au-To Compressor Co., Wilmington, Ohio, don't forget to mention the American Garage & Auto Dealer.

### Valuable Booklets Issued by Aluminum Manufacturers, Inc.

Four attractive booklets which will be of interest to the automotive trade have been received from the Aluminum Mfrs., Inc. These consist of:

A large booklet on pistons, amply illustrated, which gives a complete description of the advantages of aluminum pistons and detailed information concerning the construction of Lynite pistons which are manufactured by the company.

A small booklet, "What About Pistons,"

intended largely for distribution among car owners.

A booklet on wheels discussing in a general way the importance of reducing unsprung weight in passenger cars and trucks.

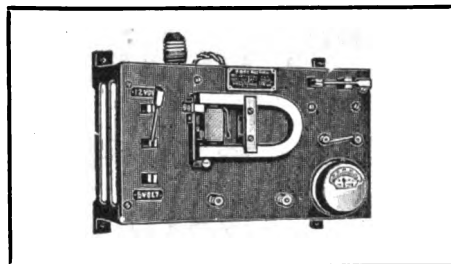
A folder covering Lynite forgings which will be interested in the savings it shows are possible in such parts as connecting rods and others, where strength and ductility are necessary.

Any readers who are interested can receive this valuable literature by writing to the Aluminum Mfrs., Inc., 6523 Euclid Ave., Cleveland, Ohio, mentioning the American Garage & Auto Dealer.

### Fore Rectifiers for Charging All Types of Batteries.

For starting and charging all types of lighting and starting batteries from an alternating current the Fore rectifiers manufactured by the Kentucky Electrical Co. are especially suitable.

These machines are portable and can be moved about in the garage when desired. They are self-starting and upon starting the line current, the charging is continuous. It is entirely safe to put a battery on charge during the night, the manufacturer says, as the ampere charging rate reduces as the voltage of the battery rises



Portable Rectifier for Charging Batteries.

and the charge nears completion. Owing to the efficiency of the rectifier, the current consumed is said to be very small and other than the price of current there is no maintenance expense or depreciation.

The type 2-B rectifier with a capacity of 12 volts can be placed on the running board of the car so that the battery can be charged without being removed or even disconnected.

Write to the Kentucky Electrical Co., Owensboro, Ky., for descriptive literature and trade prices, mentioning The American Garage & Auto Dealer.

### Zinke Co. Sales Agents for New Romort Air Station.

The Zinke Co., 1323 Michigan Ave., Chicago, is acting as sales agent for the new Romort air station, manufactured by the Romort Mfg. Co., Oakfield, Wis. It will be glad to give complete details concerning this convenient and fitting successor to the old curbstone air hose and the bothersome water bucket.

The air station stands eight feet from the ground to the top of an electrically-

lighted globe. The base and cylindrical standard are both of heavy metal construction and are of hollow design for the accommodation of the air compressor in the base, and the air hose, water hose, and electrical conduit in the standard.

### Fairbanks Co. Exclusive Distributor of Lincoln Electric Motors.

A contract recently signed between the Fairbanks Co. and the Lincoln Electric Co. of Cleveland, Ohio, gives the former company the exclusive distribution of Lincoln electric motors for industrial applications.

This line includes alternating current motors for two-phase and three-phase circuits, in capacities from one-half to 500 horsepower, for all commercial voltages and frequencies, and direct current motors from one-half to 150 horsepower. The Fairbanks Co. will also co-operate with the various Lincoln district offices in connection with the sale of the manufacturer's other products.

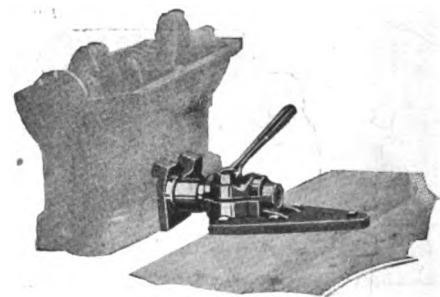
### Device for Holding Ford Motors on Work Bench.

A handy device to hold your Ford motors in position on your shop bench while working on them is the Ekern's shop-bench motor support of the H. G. Paro Co.

The support can be bolted very easily and quickly to any workshop bench and is amply strong to hold a whole Ford motor assembly. By using an Ekern axle attachment to the support, it is also possible to hold any kind of an axle assembly in any position desired.

The motor block is attached to the support by the two cap screws on the side of the motor where the inlet connection is made. The part which fastens to the motor block is the same as that used on the company's motor stand and portable engine work bench.

The casting which fastens to the motor block is made to revolve in the clamp casting, which is bolted to the bench, and by



Device for Holding Ford Motor.

tightening the clamp screw, the motor or axle can be held to any desired angle.

Write to H. G. Paro Co., 1412-14 South Michigan Ave., Chicago, for trade prices and literature, mentioning the American Garage & Auto Dealer.



# PNEUMATIC TRUCK TIRES

These "giant" tires are no longer an experiment— they have proved out. And yet their successful performance is dependent on proper inflation. This means air in heavier volume, and at higher pressure than ever needed for passenger car tires.

The progressive service station cannot afford to be without equipment for attracting this trade. Trucks are operated generally by most desirable customers.

The No. 247 Heavy Duty Tire Service Outfit is a true Brunner product—well engineered— carefully constructed— rigidly tested, and suited to its purpose. It, like the tires it will serve, is beyond the experimental stage. The engineering departments of several large tire factories have so testified.

Correspondence with truck tire dealers and other interested concerns, is solicited.

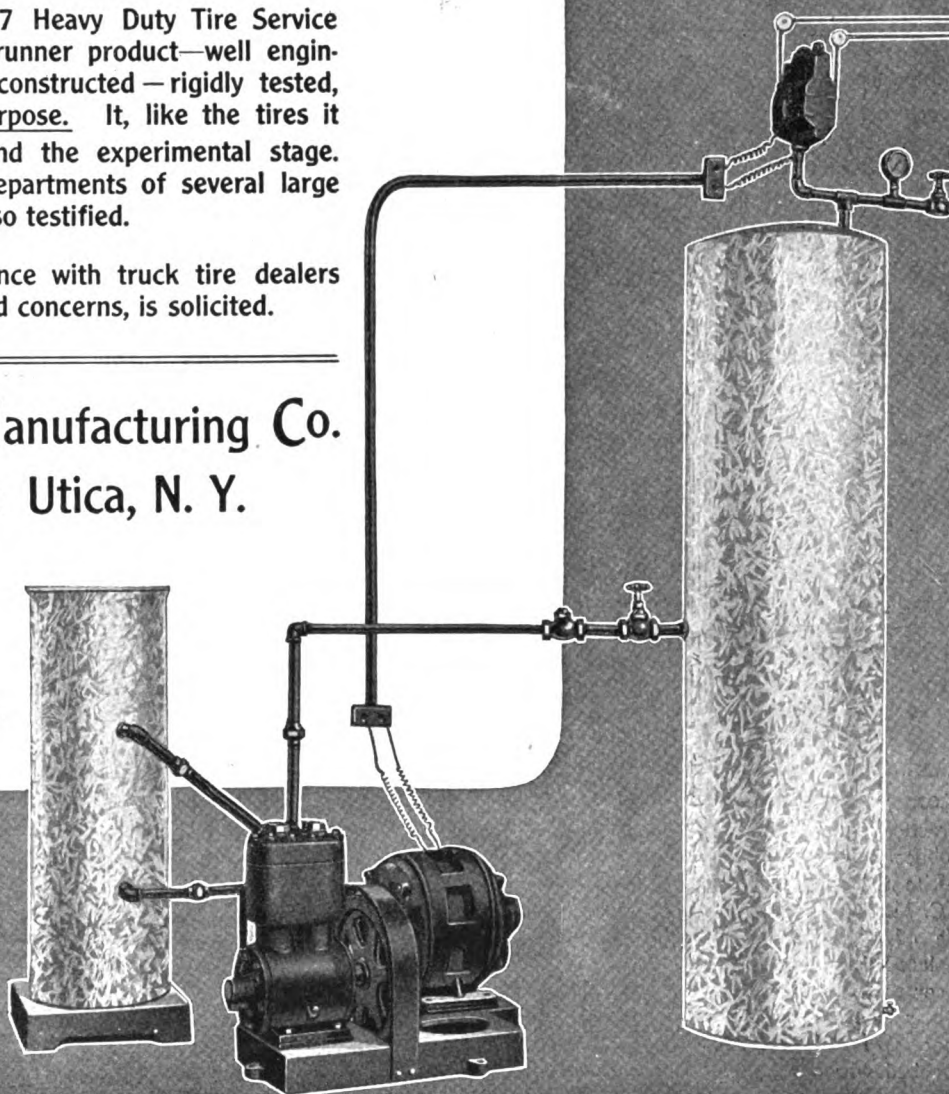
**Brunner Manufacturing Co.**  
Works: Utica, N. Y.

Sales Offices:

UTICA, N. Y.

CINCINNATI, O.

KANSAS CITY, MO.



# Accessories — They Bring in Money

## Quick-acting Dust-cap for Tires Put on Market.

The old-time dust-cap that took several minutes to screw onto the valve stem and that frequently refused altogether to come off until a wrench and a large quantity of



Kwik-On-An-Off Dust Cap.

muscular effort had been applied, is apparently doomed to extinction.

The firm of A. Schrader's Son, Inc., manufacturers of the well-known Schrader universal valves and Schrader universal tire pressure gages, has perfected a new quick-acting dust-cap which it has called the "Kwik-On-An-Off" and which will undoubtedly make a decided change in the use and application of dust-caps.

This new accessory slips over the valve stem and locks with one turn, remaining securely fastened onto the valve stem until it is necessary to take it off, when a slight turn in the other direction disengages it and permits of its easy removal. The entire operation of putting on or taking off occupies about two seconds.

Dealers and garagemen will be interested in the new dust-cap with its many desirable features. Write to A. Schrader's Son, Inc., 783-793 Brooklyn, N. Y., for literature and trade prices, mentioning the American Garage & Auto Dealer.

## Practical Cigar Lighter for Use on Automobiles and Motor Boats.

A practical device designed for use on automobiles or motor boats is the Auto-Spark-Lite cigar lighter, manufactured by the J. C. McAdams Sales Co.

Made of metal, black enameled, with nickel-plated centerpiece, having a torch of black composition with nickel-plated tips, the lighter is of decorative construction.

In operation it is very simple. A gasoline-soaked wick is ignited from a spark taken from any one of the spark-plug circuits of the motor.

It is only necessary to fasten this ornamental device to the instrument board, then attach the wire which originally runs to one of the sparkplugs to one terminal of the Auto Spark Lite.

The J. C. McAdams Sales Co., 51 East 42d St., New York, N. Y., will be glad to send a descriptive booklet and trade prices to those writing them, mentioning the American Garage & Auto Dealer.

## Signal Light Designed to Prevent Rear-End Collisions.

One of the newest automobile accessories and one which will undoubtedly meet with a ready demand, is the Roedding signal tail light which is manufactured by the Grand Rapids Brass Co.

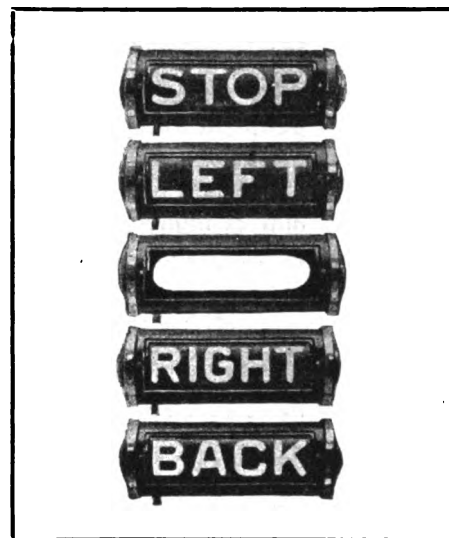
Most all rear-end collisions are due to the inability of the driver to clearly tell the driver behind just what he intends to do. An extended arm is also confusing; besides, there is great danger when the emergency brake must be applied, as the driver cannot take both hands from the steering wheel. The result is that the emergency brake brings the car to a sudden stop and the driver behind has had no warning and, consequently, no chance to avoid a smash-up.

The Roedding signal tail light, the makers claim, has eliminated this danger by flashing the proper signal in large, clear, unmistakable letters. Whether it is "Stop," "Left," "Right," or "Back," the signal desired appears on a big 10-in. by 3½-in. plate on the rear of the machine.

A small 2½-in. disk attached to the

This device operates by electricity from battery or cells. It is waterproof, dust-proof, and fool-proof, and can be quickly installed by a universal bracket to any make of car.

The Grand Rapids Brass Co., Grand

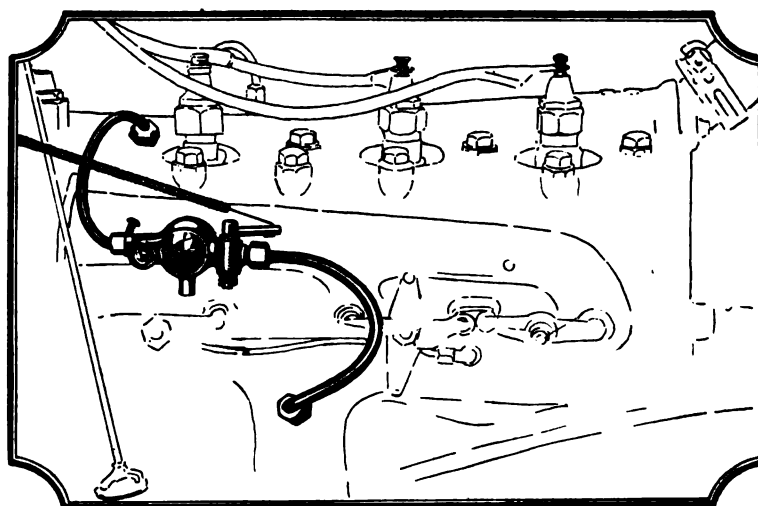


Safety Signal Tail Light.

Rapids, Mich., will be glad to give more detailed information and prices concerning this unique light to those writing for it. Don't fail to mention the American Garage & Auto Dealer.

## Automatic Steam Carbureter for Eliminating Carbon Troubles.

"The only effective remedy for carbon troubles is steam," says the Automatic



The Automatic Steam Carbureter.

steering wheel controls all signs, and without taking the hands from steering wheel your intentions are immediately understood and the driver can give his undivided attention to the roadway ahead.

Steam Carbureter Co. "Automotive engineers have recognized this fact for years. Water is a combination of hydrogen and oxygen. Steam is vaporized water. Hydrogen is combustible—or, in other words,

**The FORE**  
one-piece piston ring

Gas Tight

Compression Tight

Oil Tight

**Your Chance to Cash In**

At last piston ring troubles are over. The car owner and the wide awake dealers who handle the ring that makes this possible are going to get the cream of the piston ring business.

The Fore Piston Ring is a perfect gas-tight, oil-tight and compression-tight ring, and remains so throughout its entire life. It gives any car greatly increased power and saves gas and oil.

**Fore Electrical Mfg. Co., Inc.**  
5255 N. Market St. St. Louis, U. S. A.

Write today for particulars and prices



## Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

### Over 350,000 sets now in use

Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

**Price \$12.00 per set of four.**

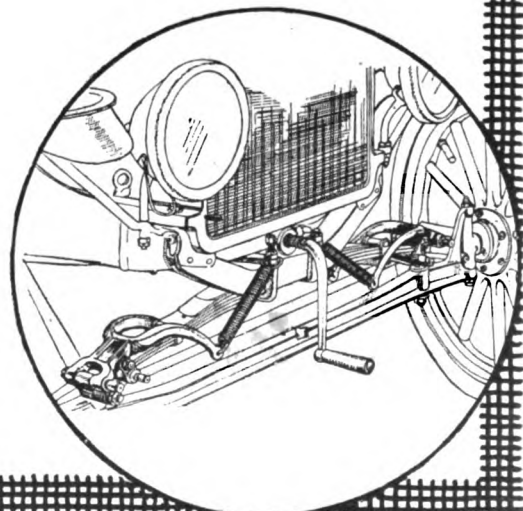
DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

**P. H. Webber Company**  
HOOPESTON, ILL.

Chicago Sales Office:

WALTER ECKHOUSE & CO., 616 S. Michigan Ave.

In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.  
London, Ont., Canada



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

it burns like the rest of the mixture.

The heat in your cylinders is 2,000 degrees Fahrenheit. This terrible heat explodes the hydrogen, thus adding to combustion and leaving the oxygen to mix with the carbon, forming carbon monoxide or carbon dioxide, which passes off through the exhaust. Water is a known solvent for carbon. Steam is water converted into its most efficient form.

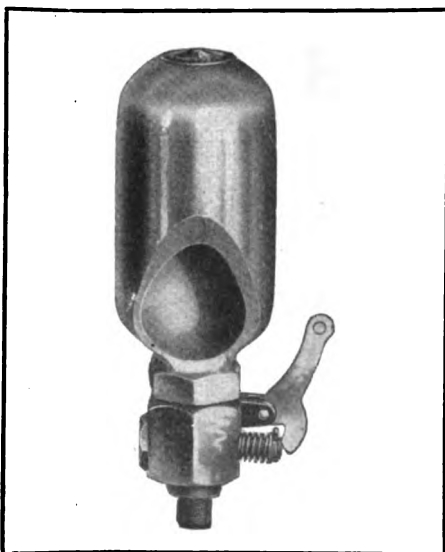
The automatic steam carbureter is a recently invented device to provide the steam for this purpose. It makes live steam, mixes it with the heated air of the exhaust pipe by means of an automatic air valve, and injects this combination into the intake manifold between the gasoline carbureter and the motor.

The steam and hot air mix the gasoline into a perfect vapor and going with this vapor all the way into the explosion chambers, keep it hot. This causes perfect vaporization and uses all of the fuel.

Write to the Automatic Steam Carbureter Co., 2488-2498 Milwaukee Ave., Chicago, Ill., for further information concerning this steam carbureter. Mention the American Garage & Auto Dealer when you write.

### Simple and Attractive Warning Signal Marketed.

The Interstate compression whistle, a product of the Interstate Tool & Mfg. Co., is a startling warning signal that is instantly installed by screwing into the priming cup opening. It is said to be simply made, thoroughly reliable in its action, and is guaranteed for the life of the car or truck. In short, it is highly recommended.



The Interstate Compression Whistle.

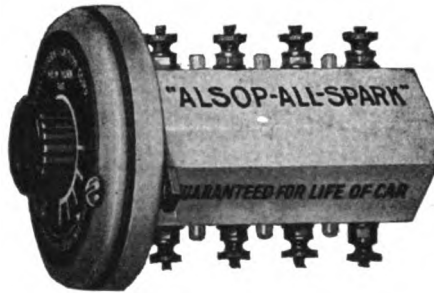
The whistle fits cars of all makes, adapters being supplied for cars without priming cups. Operation is from the driver's seat. In appearance, the device is attractive as the bowl is of polished aluminum and the valve of phosphor bronze. It comes in three models.

The Interstate Tool & Mfg. Co., Sales

Dept. at 624 South Michigan avenue, Chicago will give trade prices and other information concerning this compression whistle to those writing them, mentioning the American Garage & Auto Dealer.

### The Alsop-All-Spark Prevents Sparkplug Trouble.

The Alsop-All-Spark designed to prevent the running of the engine with a mis-fire



The Alsop-All-Spark Device.

and the changing of sparkplugs is placed on the market by the All-Spark Ignition Co.

Controlled from the inside of the car, this invention, the makers claim, gives reliable assurance against annoying delays and soiling labor at undesirable times. It eliminates in times of emergency all sparkplug troubles, when dependability of continued riding is most essential.

This device interposes and mediates in the path of the current on the way from the distributor to the sparkplugs, and acts to convert the electricity into a higher voltage. At the same time, it acts to accumulate the volume, and so surcharges the intensity and speed of the current, that it becomes a literal chain of fire.

An important feature is that the electricity is controlled as regards both amperage and voltage. As voltage is raised, amperage is automatically reduced, which prevents the points of cheapest plugs from arcing or burning off.

The high-voltage spark is able to penetrate at high speeds and explode the compressed gas, which offers such great resistance to the low voltage spark.

That it eliminates sparkplug mis-fires, causes all current to jump across points of sparkplugs, instead of all or part being shorted through carbon deposits, raises voltage, increases efficiency of motor, insures clean plugs, and retards formation of carbon in cylinders, are the further claims of the manufacturers.

For additional information, write to the All-Spark Ignition Co., 13 Water St., New York, mentioning the American Garage & Auto Dealer.

### Puncture Proof Device Manufactured by Tire In-Sole Company.

A new puncture proof device called "Tire In-soles" with "Mile Multiplied" as a sub-title, is being placed on the market by the Tire In-Sole Mfg. Co.

It is explained, that the new device gives multiplied mileage by the elimination of punctures and the prevention of blow-outs. The expense of repairs being greatly lessened can also be figured in as extra mileage.

One feature of "Tire In-Soles" which the company is very proud of, is the use of a wide woven, high tensile strength fabric, shock-stop breaker strip. Mr. Hart, president of the company, compares this with the reinforcement used in concrete construction. He says this fabric stop gives the necessary support and strength.

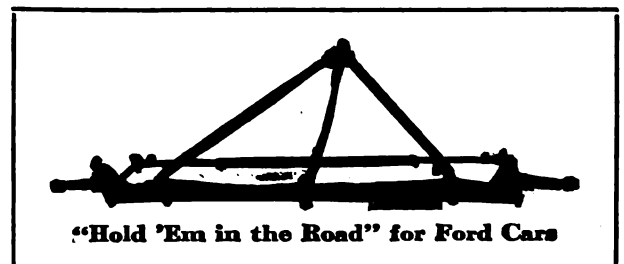
Trade prices and printed matter concerning the device will be sent to those writing the Tire In-Sole Mfg. Co., Findlay, Ohio, mentioning the American Garage & Auto Dealer.

### Serviceable "Hold 'Em in the Road" Attachment for Ford.

A practical device produced by the Casco Mfg. Co. is the "hold em' in the road" attachment for Fords, consisting of a center brace running from the center of the axle to the rear of the radius rods and having a hole through which the tie rod passes. The springs, one on each side of the center brace, encase the tie rod and are held in place at the outer end by set collars. The device is bolted tight with the wheels lined up straight ahead.

It is a radius rod brace, anti-rattler, axle support and steering device all in one. The maker says that it gives complete control of the steering without hanging on tight, makes a sweeping readjustment of Ford value as applied to road ability and comfort, and is a combination of four of the most important attachments of the Ford.

This attachment is claimed to stabilize the turn of the front wheels of the Ford.



The Hold 'Em in the Road Attachment for the Ford.

prevent wear and tear on all parts of the front axle, steering gear and tires, brace the radius rods, and prevent the tie rod from rattling.

Address the Casco Mfg. Co., Thomasville, Ga., for literature and prices, and don't forget to mention the American Garage & Auto Dealer.



# PUT THIS HANDY HELPER TO WORK in your garage

## "LITTLE GIANT" GEAR AND WHEEL PULLER

makes easy work of those "tough jobs" removing gears, wheels or pulleys. Does the work in half the time required with the ordinary tool.

Has a wide range of usefulness—can be adjusted for inside and outside and all sorts of angular pulls. Easily adjustable up to 13 inches in diameter. Cannot slip off work.

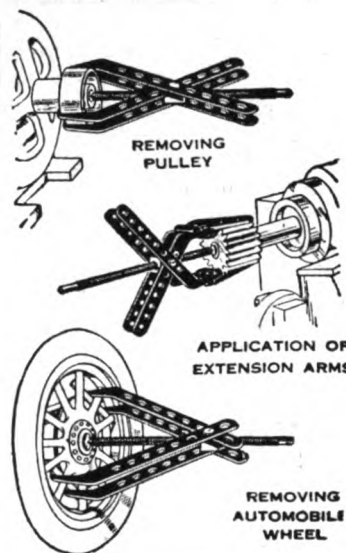
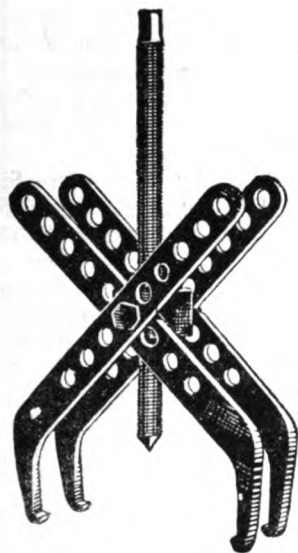
The principle is correct—the result is maximum efficiency with minimum effort.

The "Little Giant" pays for itself on the first job and the reduction in operating costs that it effects make it a highly profitable tool.

List price complete with extension arms, \$11.00.

DEALERS—Order from your jobber or direct, if he cannot supply you. Your price is \$7.70.

Premier Motor Products Company  
3954 N. Robey Street CHICAGO, U. S. A.



# You get a good share of the profit.

The **MODEL "N" MARVEL CARBURETER** improves car performance, and increases mileage from 22 to 25 miles per gallon.

No changes are necessary to install it. Fits right in place of regular installation.

## MARVEL CARBURETER

*Designed especially for FORDS*

sold on 30 days' trial, with money back if not satisfactory.

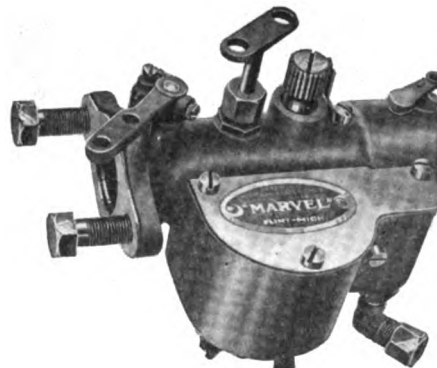
Price F. O. B. Factory \$10.00

**MODEL "E" CARBURETERS** are standard on Buick, Oakland, Nash, Scripps Booth, GMC, Wilson and all  $\frac{3}{4}$ -ton U. S. A. Government Trucks.

**MODEL "E" Carbureters** greatly improve Maxwell, Overland, and Studebaker cars.

DEALERS--If interested, write for further information

**MARVEL CARBURETER COMPANY**  
FLINT, MICHIGAN, U. S. A.



# News of Manufacturers and Jobbers

## Premier Metal Products Co. Organized—Unique Sales Plan.

It is announced that H. A. Cook, well known among the automotive and accessory trade, and former general sales and



H. A. Cook, President and Organizer of the Premier Motor Products Co.

advertising manager of the Premier Electric Co., has completed the organization of the Premier Motor Products Co.

This company has contracted with the automotive division of the Premier Electric Co. for the exclusive distribution of its products for a term of years. Mr. Cook states that it is his intention to contract with other manufacturers on a similar basis in the near future; but for the present the efforts of the organization will be confined to the merchandising of Premier automotive products.

Unlike most other sales organizations, the Premier Motor Products Co. plans to purchase the manufacturers' products outright and become responsible for the entire output, assuming all sales and advertising expenses. This plan assures the factory of volume distribution and a guaranteed manufacturing profit.

## Utilitarian Makes Initial Bow to Jobbers and Dealers.

The "maiden edition" of the Utilitarian, house organ of the Utilities Sales Corp., has just been received. As its name implies, the Utilitarian is a magazine for service to everyone, but in particular to jobbers and dealers in automotive equipment. It will from time to time publish various matters of interest that assume national proportion and directly affect the automotive business.

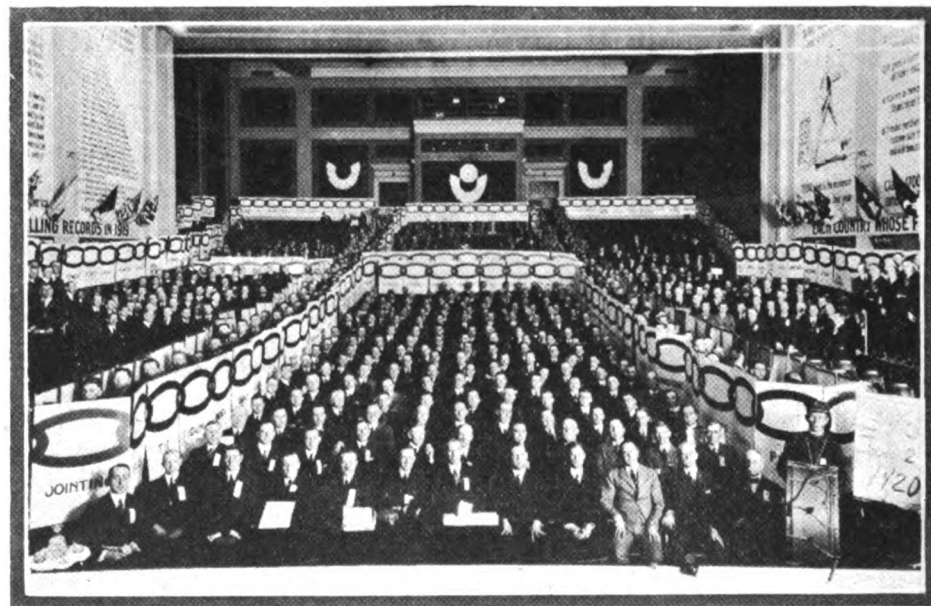
The policy of the organ is further expressed in the following stanza found on the editorial page:

Let us be frank with each other.  
Let us make this "game" a business.  
Let us stick to our promises.  
Let "seller" be honest with "buyer."  
Let "buyer" be honest with "seller."  
Let us make more money.  
And lastly, let us be friends.

The Utilitarian will be published six times this year and 12 times in 1921, and the Utilities Sales Corp., 811 Stock Exchange Bldg., Philadelphia, Pa., will be glad to put any interested garage, repair shop, service station, or accessory dealer on its complimentary mailing list to receive regular editions of their magazine. Mention the American Garage & Auto Dealer when you write.

## National Cash Register Salesmen Hold Enthusiastic Convention

"Do your best. If you are in doubt at any time, simply do right and you will be right." That was the message of John H. Patterson, president of the National Cash Register Co., to his salesmen, at the recent convention of the N. C. R. Hundred Point Club, which was undoubtedly the best ever held by that company. Each of the members is a 100 per cent salesman, and to become a member it is necessary to secure 100 per cent or more of a year's quota.



This Picture Shows a National Cash Register Pageant in Which 395 Men Took Part—Each Man Carried a Banner Representing a Different Manufacturing Operation.

At the convention the slogan, "Appreciative but not satisfied," was adopted.

"We are appreciative of the efforts made by everyone connected with this organization," said First Vice-president J. H. Bar-

ringer in his opening address. "However, we are not satisfied that we can't do better. The success of the company is largely due to the fact that it is never satisfied with past achievements.

Throughout the week the agents and salesmen were urged to "Get the Big Idea," to become bigger, better, broader business men; to become a power for good in the home communities; to give better service to merchants in all parts of the world.

## Death of Dr. Cole, President of A. Schrader's Son, Inc.

The death at Pasadena, Calif., of Dr. Charles K. Cole, president of the A. Schrader's Son, Inc., removes one who was long a prominent figure in the social and political world of Montana.

A former president of the Montana State Senate, Dr. Cole was noted as one of the rare examples of a man achieving distinction in three separate and widely-different fields of endeavor, having attained prominence as a lawmaker and public official, a physician and surgeon, and in business and industrial circles.

Dr. Cole was born in Plainfield, Ill., in 1852 and received his earlier education in Lincoln University and Miami Medical College. After post graduate courses in New York and Chicago and training in the hospitals of Europe, he took up the practice of medicine in Helena, Mont.

# STORM

## MOTOR REPAIR EQUIPMENT

### Makes Your Garage an All 'Round Repair Shop

Equips you to handle the most profitable class of work—overhauling and rebuilding. Storm Tools are practical and can be operated by inexperienced men. They soon pay for their cost in doubling the efficiency and output of your shop. Write us for complete information.

**STORM MFG. CO.** Dept. E Minneapolis, Minn.

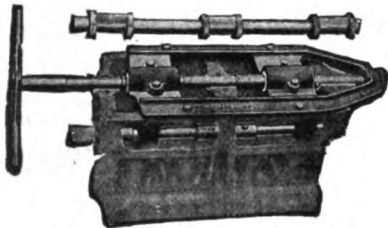
*STORM Standard Reboring Machines* are built in various capacities to suit your requirements.

For hand or power operation.

Get These Bigger Profits



*STORM Main Bearing Babbitting and Boring Tool* makes a new, perfect bearing exactly the same as the original and in the exact original position. Two sizes—Ford and Fordson Motor.



*STORM Connecting Rod Bearing Reamer, Jig and Straightening Gauge* accurately and quickly fits and cleans connecting rod bearings. Solves labor problem—no experience necessary to operate.



Pat. 3-19-'18.

**Spark Plug Troubles Are Rare Occurrences** on the car equipped with

### UNIVERSAL or MARVEL SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon. These **INTENSIFIERS** will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

**EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM**

**JOBBER and DEALERS—Your profit is liberal.** Write today for our attractive proposition.

**UNIVERSAL MFG. & SALES CO.**

550 W. Harrison Street

CHICAGO, ILL.

## FOLEY TRACTION RIMS

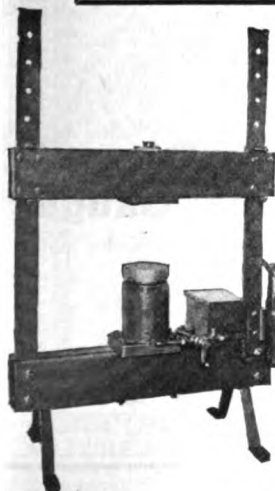
carry trucks over any roads

Equipping a truck with Foley Rims makes it available for service at all times regardless of road conditions. They come in contact with soft roads only. Can be attached or detached in 20 minutes.

Foley Traction Rims are Electric Steel Castings, guaranteed not to break.

**DEALERS:** Stock this quick selling accessory. Your profit is liberal. Write for full information.

**FOLEY TRACTION RIM CO., Inc.**  
827 Hennepin Ave. MINNEAPOLIS, MINN.



## LOURIES

newest  
**HYDRAULIC ARBOR PRESS**  
TYPE Z

Well adapted for the garage or machine shop. Adjustable crosshead. Position changed by hydraulic pressure—no heavy lifting.

Particulars on request.

**LOURIE MFG CO.**  
SPRINGFIELD ILL.



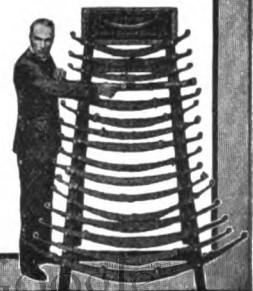
When Springs Break, put on

**VULCAN**  
The Replacement Spring

This display rack **FREE** with first order.

**Best known for**  
**Best Quality—**  
**Best Service—**  
**Best Profits—**

**Jenkins Vulcan Spring Co.**  
Factory  
RICHMOND, IND.



geons and filled the offices of president of the State Senate, president of the city council of Helena, and president of the Helena Chamber of Commerce.

His business interests in Montana included banking, mining and real estate, and his activities extended to other cities. He was at the time of his death president of A. Schrader's Son, Inc., New York City.

### Norwesco Sales Convention an Inspiration to Representatives.

A convention of the salesmen of the Northwestern Chemical Co. was held recently in Marietta, Ohio. All representa-

tives were present, 18 in number, including the Canadian salesmen.

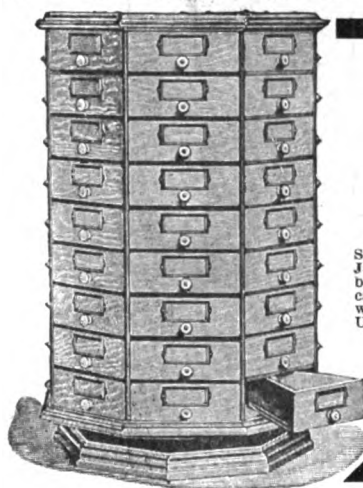
Unlike so many conventions which are often considered tiresome and uninteresting, the Norwesco 1920 sales assembly found something new and entertaining from morning to night and every one present voted it the biggest and best ever held.

Topics of general interest on advertising and salesmanship were taken up in detail throughout the week, laboratory tests were made for the benefit of the representatives, and the 1920 efforts of every man were dedicated by the president of the company, Fred Hall, as Norwesco's share of the help in squelching the anti-American feelings of today.

### Jenkins Vulcan Spring Co. Announces Additions to Personnel.

The following additions have been made to the personnel of the Jenkins Vulcan Spring Co. of Richmond, Ind.: D. T. Hershey, former assistant general sales manager for the Splitdorf Electrical Co., Newark, N. J., has been appointed sales manager.

A. L. Ellis has been appointed production manager. Mr. Ellis is one of the pioneer leaf spring makers of this country, having been associated with the production of leaf springs for over 20 years. He was formerly with the spring division of the Detroit Steel Products Co.



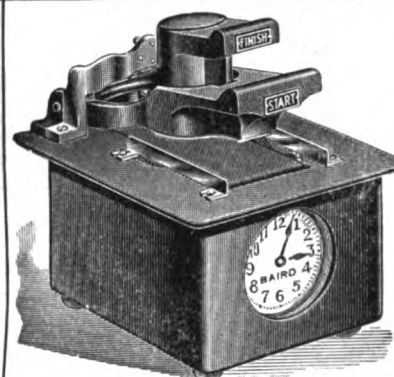
### Keep your supplies in revolving cabinets like these

Systematic! Conveniently Accessible! Just like "rolling off a log" to look up bolts, screws, etc., with this revolving cabinet. Everything at your finger tips, with nothing to burden your memory. Used by leading garages of this country.

Buy today from your jobber. Catalogue on request.

**American Bolt & Screw Case Co.**  
DAYTON, OHIO

### Put your repair charges on a profitable basis with



### BAIRD TIMING DEVICES

Keep a check on your employees' time and learn exactly what each job costs. Automatic supervision turns losses into profits.

Prices moderate. Write today for booklet.

**Baird Equipment Co.**  
324 W. Ohio St., Chicago  
Phone Superior 2071

### If One-half the Dealers Knew

the real facts of how they could supply a modern Spring Bar Bumper of double strength for every car desired—front and rear,

### An Output Ten Times Larger

couldn't fill the demand.



### New Era "Better" Spring Bumper

Interchangeable for ALL cars by detachable arms, furnished for every car—front and REAR and freely exchanged for any car desired.

The most complete catalog showing arms for EVERY car—front and rear—will EARN HUNDREDS of dollars for any dealer. If your jobber won't furnish Spring Bumpers with the name "NEW ERA" and patent dates between the double bars, ask us the name of nearest jobber. The catalog also shows "BETTER" Springs and Tire Carriers for ALL cars.

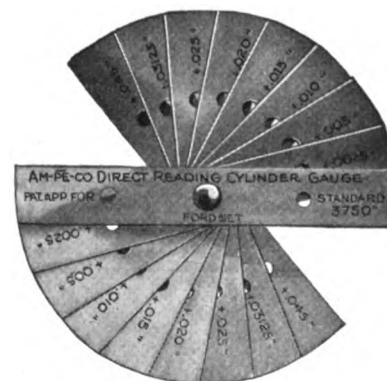
**New Era Spring and Specialty Company**

1152 Hamilton Ave.

Grand Rapids, Michigan

### You Don't Guess the Answer You READ It on the Blade

Cylinder measurements guaranteed accurate to within .00025" and less.



### The AM-PÉ-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

Get the whole story in our Circular

PRICE \$2.50

**AM-PÉ-CO SALES CO.**  
MARSHALLTOWN, IOWA



# The TIRE FILLER that has made good



## Trouble-proof tires with ample resiliency

is a combination that was long sought by the motoring public. Some tire fillers failed to stand up under long service—most of them lacked the essential resiliency. But these two vital qualities were at last combined in

## NATIONAL RUBBER TIRE FILLER

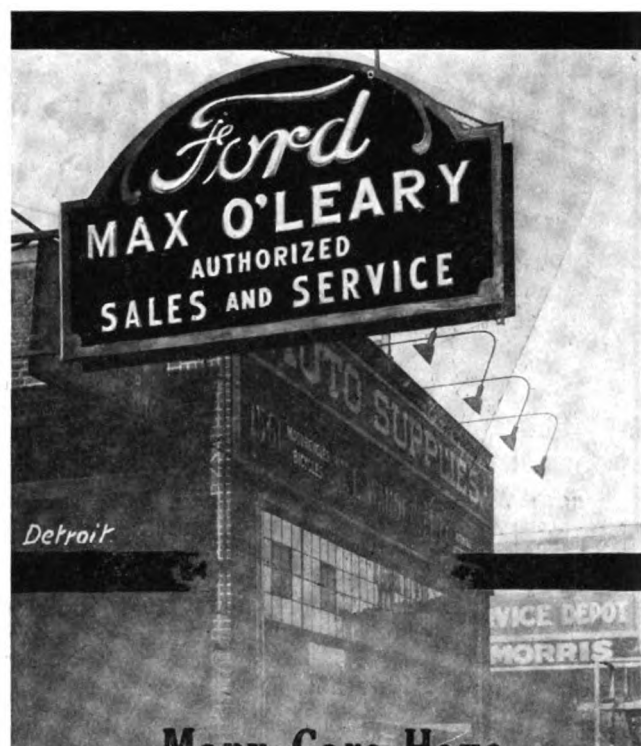
It has brought joy and satisfaction to tens of thousands of car and truck owners. It has done away with punctures, vulcanizing, patching, tire repairs of all kinds. Users get 10,000 to 20,000 miles out of every tire.

Besides, National Tire Filler has a wonderful resiliency. It takes the place of air, rides as easy, and does away with the inner tube.

National Rubber Filler is made of the best grade of rubber, cut in small particles, treated, moulded and vulcanized by our special process. The result is a compound that is light, strong and resilient. Made in sizes to fit all standard tires. It is laid in the tire and not melted or poured in. Will not harden, freeze, or melt—fully guaranteed against deterioration in any form.

DEALERS—National Rubber Tire Filler sells because it has made good. It combines comfort with economy of tire upkeep. We have a fine proposition for you. Write us today.

**National Rubber Filler Co.**  
210 College St. Midlothian, Tex.



## Many Cars Have Standard Oplex Designs

MANY of the leaders among the makers of pleasure cars and trucks have fixed upon an Oplex design as the standard sign of their sales organization. These signs usually have the distinctive lettering of the trade name reproduced on Oplex raised white letters and standing out from a dark background.

Such signs show people where the cars they read about can be bought—they connect the trademark with the sign.

Oplex Electric Signs are day signs as well as night signs. They have greatest reading distance, most artistic design and lowest upkeep cost.

Probably the makers of the car you handle have fixed upon an Oplex Sign. Let us tell you about it and send you a sketch showing how the sign will look.

**The Flexlume Sign Co.** Electrical Advertising  
BUFFALO, N. Y. Niagara St. & Potomac Ave.  
Pacific Coast Distributors Canadian Distributors  
Electric Products Corp. The Flexlume Sign Co., Ltd.  
Los Angeles, Cal. Toronto, Ont.



### Why Worry Over Repair Shop Problems?

#### Get This 500 Page Book!

Gives the facts the repairman needs to thoroughly understand the theory of electricity and its application to the operation, care and repair of starting, lighting and ignition systems. Complete in detail and thoroughly practical. Used and recommended by all manufacturers. Price, Prepaid, \$2.50. Order a copy today.

Dealers and Agents Wanted

**H. E. PHILLIPS & CO.**

BOX 55

UNION CITY, INDIANA

Formerly, Phillips Engineering Co. and Auto Electric Systems Co.  
Dayton, Ohio



## Eckern's Motor Stand for Ford Motors

The handiest device of its kind for Ford engine work. The Ford motor when taken from a car can be fastened to the stand by two screws at water inlet connection. The part of the stand which is screwed to the motor can be revolved or locked tight holding the motor in any position or any angle desired by the workman.

It also has a handy tool tray for wrenches, parts, etc. Mounted on wheels so it can be moved from place to place. List Price \$20.00.

We also manufacture Eckern's Portable Work Bench and Engine Stand (an exceedingly complete outfit)—List Price \$40.00; and Eckern's Shop Bench Motor Support—List Price \$10.00; and Eckern's Axle Attachment for these stands—List Price \$6.00.

Ask Your Jobber or Write for Full Information



1412-14 S. Michigan Av.

CHICAGO, ILL.

## GANSCHOW GEARS

for service and reliability

The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

Write today and feel free to consult our Engineering Department.

**Wm. Ganschow Company**

1002 Washington Boulevard  
Chicago, Illinois



## Pondelick Brothers

will  
pay **\$100**

if they fail to duplicate any part of any make of automobile or truck foreign or domestic, submitted to them. That sum will be paid to the person sending the order.

Parts of any machine can be duplicated in 1 to 3 days' notice. All welding is done at their risk. Do not compare this work or welding with that of others. If you have a broken part or parts that others cannot weld or repair, send them to Pondelick's. They increase the durability of many parts—even where the manufacturers fail.



Supply your customers with "Pondelick's" anti-leak piston rings, and you insure them against engine trouble.

They have the largest and best equipped plants in the United States for the repair or reproduction of automobile parts.

Cylinder regrinding, new piston, special casting, heat treated, Pondelick's self-adjusting, anti-leak piston rings, new wrist pin, hardened and ground, bushing made of genuine bronze, including fitting and assembling of connecting rod to piston for \$15.00.

Reputation, not competition, determines our policies. Visit our plants and be convinced. Ask anywhere or anybody about our work.

General Factory, 5100 to 5112 West 16th St.  
Main Office, Leavitt St. and Jackson Blvd.

**Pondelick Brothers,** CHICAGO ILLINOIS

# FORE

**Charges batteries at cost of 5 to 15¢**

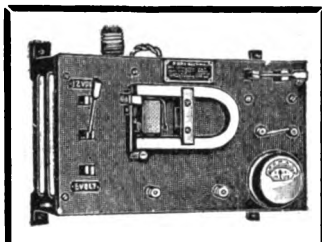
FORE RECTIFIERS are unexcelled for simplicity, efficiency and economy. They are practically automatic, easy to operate and do not injure batteries. They operate by attaching plug to lamp socket.

You can make phenomenal profits with a FORE RECTIFIER on account of the low charging cost, 5c to 15c per battery.

Made in five sizes embracing every requirement. Type 2B, illustrated below, has a capacity of 12 volts, and will charge both 6 and 12 volt batteries. This type can be placed in running board and battery charged without removing from car.

*Write today for literature and prices on our entire line.*

**KENTUCKY  
ELECTRICAL  
COMPANY**  
INCORPORATED  
OWENSBORO, KY.



## YOU HAVE READ THE ARTICLES NOW USE THE SYSTEM

Forms and Leaves, Comprising  
the

### GARAGE BOOKKEEPING SYSTEM

as outlined by J. Newton  
Boddy in a series of articles  
now running in this maga-  
zine, are now offered  
for sale by

**Jeffrey & McPherson Co.**  
MINNEAPOLIS, MINN.



SIMPLE AS "ABC"

**A Simple, Concise Method,  
Easily Understood by Any  
Garage Man.**

Write, stating your require-  
ments, and Mr. Boddy will give  
personal attention to your letter.

## YOU CAN DO THIS WORK

The Universal Main Bearing Babbiting and Boring Equipment for Ford and Fordson Motors is highly endorsed by 14 out of the 16 Ford dealers in the city of Detroit—"The Home of the FORD."

This is a recommendation of which we are proud.

Garage-Men! Let us help you to build a bigger and better business.

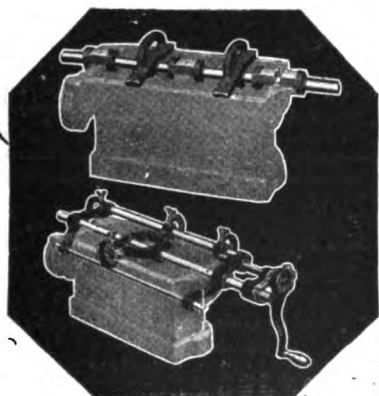
*Write for nearest jobber.*

**The UNIVERSAL TOOL CO., Inc.**

*Manufacturers of UTCO Products*

435 Woodward Avenue

DETROIT, U. S. A.



## GARAGE



**A. Schrader's Son**  
Brooklyn N.Y.

Kindly hurry that order for Inflating  
Valves. We had no trouble with our  
Free Air Station as long as we used  
this Valve but when we had to put in  
another make,—the fun began.

EXTRACT FROM ACTUAL LETTER RECEIVED.

Make Money Equipping Old Fords With These Classy  
**"FIDELITY" BOODIES**-- For Fords--Medium Priced  
 Stylish Touring, Club Roadster, Speedster and Torpedo Models |  
 Handsome Up-to-Date  
 Bodies at all Prices.

**\$35**

AND UP

WE SELL WHOLESALE ONLY!



If You Are a Dealer

Send for our illustrated confidential net price list. "The Little Salesman" of  
**AUTOMOBILE ACCESSORIES**

New England Mills Co. 1027-1033 W. Van Buren Street Chicago

## MAKE BIG MONEY REMILING TIRES

Write today for the facts

**Miller**  
**AD-ON-A-TIRE**

The only perfected tire remiler

**The Miller Rubber Company**  
 Dept. A231 AKRON, OHIO  
 Makers also of Miller Uniform Geared-to-the Road Tires and Red  
 and Gray Inner Tubes--Team-Mates of Uniform Tires.

## AUTOMOTIVE "EQUIPMENTLY" SPEAKING

OUR LOCATION HAS ENABLED US TO BECOME

QUICK SHIPPERS

N EQUIPMENT. REPAIR MACHINERY AND ACCESSORIES  
 FOR THE "BIG FIVE"

Motor Car--Motor Truck--Tractor--Motor Boat--Aeroplane

WE ARE TERRITORIAL DISTRIBUTORS FOR  
 Service Station Equipment Co. Inc., of Chicago, Ill.  
 "AMBU" Battery Station Appliances  
 Firestone Demountable Rims.

ESTABLISHED 67 YEARS

**BECK & CORBITT**

AUTOMOTIVE EQUIPMENT

1222 to 1244 North Main Street ST. LOUIS, U. S. A.

## REPAIRMEN -- LISTEN!

The Heiser

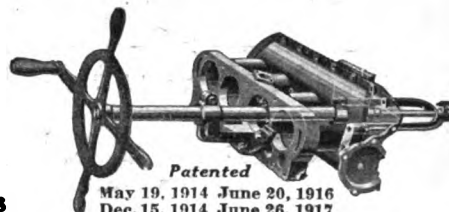
Improved

Cylinder

Reboring

Tool for

Ford Motors



Patented  
 May 19, 1914 June 20, 1916  
 Dec. 15, 1914 June 26, 1917

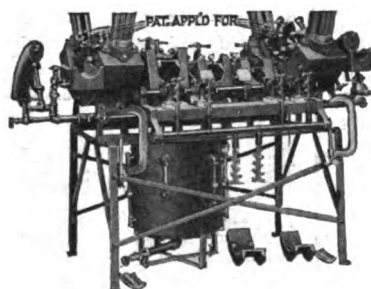
is the only Reboring Tool in the world that is self sharpening. It is the only  
 Tool except expensive grinders that will not leave the finished cylinder slightly  
 tapered toward the bottom. It is the only Tool that rebore between centers--  
 this insures a finished cylinder, square with the crankshaft, round, straight  
 and true. It is adjustable, and the only Tool that will rebore different sizes  
 without losing the adjustment.

The best mechanic in the world can't build reputation without proper TOOLS and  
 EQUIPMENT. The HEISER IMPROVED CYLINDER REBORING TOOL  
 makes good shops out of poor ones and better shops out of good ones.

Write today for full particulars.

Heiser Special Tool Co., 2001-21 Washington St., Kansas City, Mo.

## GRASP THIS OPPORTUNITY TO MAKE BIG MONEY



Open a TIRE REPAIRING  
 SHOP--it is sure to be a success.  
 Figure it out yourself. Hundreds  
 of automobiles means hundreds  
 of tires that constantly need re-  
 pairing. You get this business  
 and make big money. No pre-  
 vious training necessary. We  
 instruct you free--teach you  
 everything.

**VANDERPOOL  
 VULCANIZER**

(5 cavity) has capacity of \$300  
 worth of work a day, repairs tires  
 just as they are made at the fac-  
 tory. Investment small and imme-  
 diate returns. Write today for full  
 particulars and FREE TIRE  
 REPAIRING MANUAL.

**WM. VANDERPOOL CO., Springfield, Ohio**

In answering, address Department L

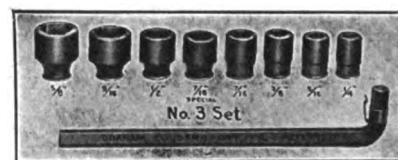
## GRAHAM SOCKET WRENCHES

Are turned from the best Solid Bar  
 Steel and are Heat Treated. For

**STRENGTH and RELIABILITY**

They are unexcelled. Ask for dealer's discount.

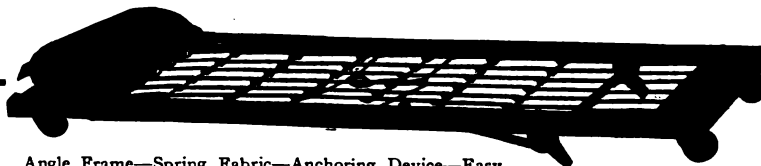
Price  
**\$1.75**



**Graham Roller Bearing Co., Coudersport, Pa.**

**Foster**

Auto Repair Creeper  
 ALL-METAL CONSTRUCTION



Angle Frame--Spring Fabric--Anchoring Device--Easy  
 Rolling Casters. Insuring a longer, more economical and  
 efficient service than any creeper built.

**FOSTER BROS. MFG. CO., UTICA, N. Y., U. S. A.**

**\$5.00**

Ask for the name of the Foster distributor in your territory.

DIRECT REPRESENTATIVES

Eastern and Southern States: Asch  
 & Co., 18-24 W. 61st St., New York,  
 N. Y. For the Mid-West: Jessop &  
 Thompson, 1421 S. Michigan Ave.,  
 Chicago, Ill. Pacific Coast & Inter-  
 mountain Territory: McDonald &  
 Linforth, 739 Call Bldg., San Fran-  
 cisco, Cal.

**AUTOMOBILE  
 SPRINGS**  
 MANUFACTURERS AND SPRING SERVICE  
**GARDEN CITY SPRING WORKS**  
 2300 Archer Ave. Chicago

## KENNEDY Auto Storage Covers

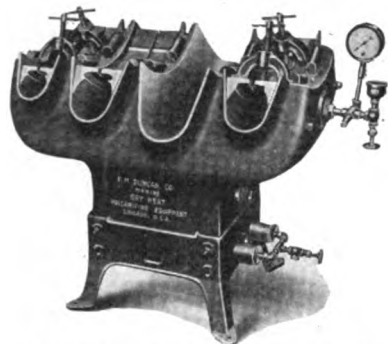
furnish efficient protection for cars in dead storage.  
 They are made of strong, heavy paper, properly  
 reinforced, and in standard sizes to fit any car.

Made only by

**THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind.**



## Duncan Equipment Marks a New Era in Vulcanizing



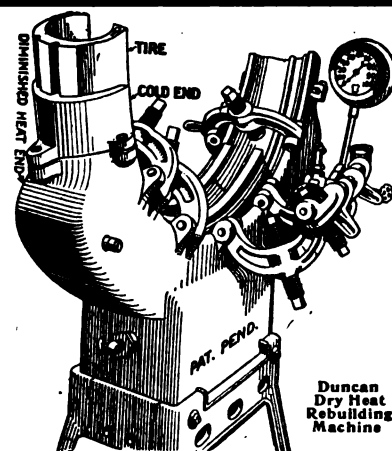
Duncan Adjustable Cavity Sectional Mould

The Duncan Dry Heat Rebuilding Machine will rebuild a tire with sides and laps perfect in construction and finish—comparable with the single cure factory mould.

The Duncan Adjustable Cavity Sectional Mould with its cavity sides and side plate construction affords a correct cavity shape and size for each tire cured—this feature is not found in any other mould.

*Only good vulcanizing pays. If you want to control this business in your locality, investigate Duncan Equipment. Particulars on request.*

F. M. DUNCAN CO., 114-116 E. Ohio St., Chicago, Ill.



Duncan Dry Heat Rebuilding Machine

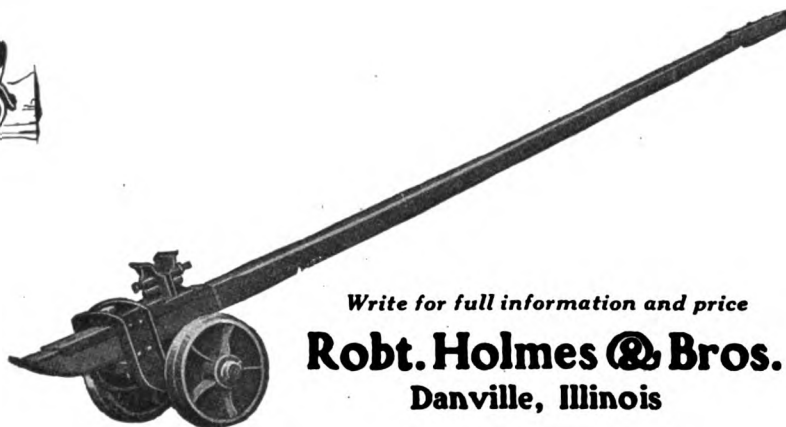


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When you get that call, be prepared to go to the rescue with a

### Holmes Wrecking Truck

You can get the crippled car to your shop quickly and easily. The time and labor saved soon pays for it. Made of the best materials with ample strength for any job.



Write for full information and price

**Robt. Holmes & Bros.**  
Danville, Illinois



Auto owners and tire dealers who sell old tires for junk prices are picking their own pockets.

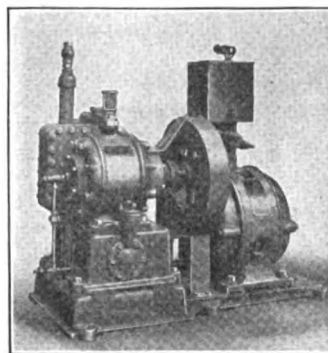
There's money in those old tires, even if they are sand-blistered, punctured, rim cut, or blown out.

**Send them to us.**

We remake them by a process that gives them at least 5000 more miles of service. There is a good market in every locality for these tires, and you can sell them at a good profit.

Write today for our proposition, and start saving those old tires.

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804 Commercial Avenue  
Cairo, Ill.



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Weigh less than half of other types but will satisfy the most exacting. **Note these features and write for full particulars.**

Slow Speed, No Vibration, Positive Displacement, Easy to Install, Simple to Operate, Perfect Balance, Quiet in Operation. Especially adapted to garage purposes.

**JACKSON  
COMPRESSOR  
COMPANY**



231 S. Cherokee St.  
**Denver  
Colorado  
U. S. A.**

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## SUNDERLAND'S

give satisfaction

MAGNALITE or CAST IRON PISTONS

SPECIAL PRICES ON FORD JOBS

REGRINDING NEW PISTONS

SUNDERLAND MACHINE SHOPS

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*The trade finds our service a great convenience.*

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Successors to

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Highest grade machinery and tool equipment, no makeshift tools. This equipment with our years of experience in the automotive business insures you highest grade work at the hands of experts. Work fully guaranteed. Patterns for all pistons, 25,000 piston rings and 5,000 wrist pins in stock. We are the acknowledged leaders in our line.

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put six cylinder smoothness into four cylinder motors, give any motor more power, more speed, quicker get away and more miles per gallon with less bearing trouble.

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keeps the motor cool, increases power and speed.

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(FOR EVERY MAKE OF MOTOR)  
STANDARD OR OVERSIZE

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ALL WORK INSPECTED

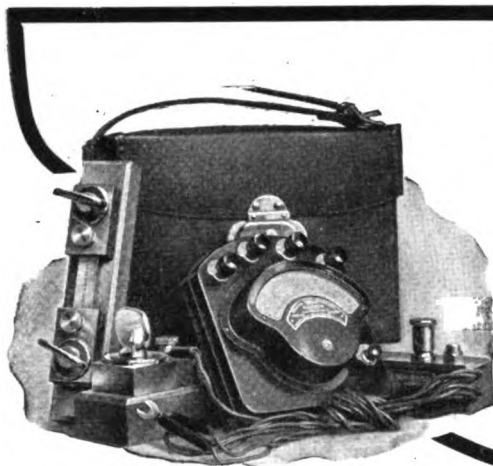
Established 1897 **Butler Manufacturing Company**  
INDIANAPOLIS, IND.

With our

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goes a

GUARANTEE  
of SATISFACTION



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If you can repair and adjust Electrical Equipment, you will get the cream of the garage business and make more money. With the increasing demand for service of this sort, you must equip to handle the business, or lose it to your more enterprising competitor.

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Largest Car Wreckers in the World  
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**PISTON RINGS**

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**WAGNER AUTO ENGINE CLEANER**

One qt. kerosene and 6 lbs. air pressure cleans all dirt, grit and grease from engine. Prevents wear, actually saves half the usual repairs. Quick, economical, thorough, easy and cleanly to operate. Necessity for repair shops.

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Spur, internal, bevel, etc.

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Write us today

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Casco Mfg. Co., Thomasville, Ga.  
The M. W. Duntou Co., Providence, R. I. (Radiator Core).  
New England Mills Co., 1027 W. Van Buren St., Chicago.  
New Era Spring and Specialty Co., Grand Rapids, Mich.

## AIR COMPRESSORS

Au-to Compressor Co., Wilmington, Ohio.  
Brunner Mfg. Co., Utica, N. Y.  
Champion Pneumatic Machinery Co., 1402 S. Michigan Ave., Chicago.  
Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.  
General Utility Co., 1333 Ogden St., Philadelphia, Pa.  
Globe Mfg. Co., Battle Creek, Mich.  
Jackson Compressor Co., 235 S. Cherokee St., Denver, Colo.  
U. S. Air Compressor Co., 6542 Carnegie Ave., Cleveland, O.  
Utility Sales Corp., 808 New Stock Exchange Bldg., Philadelphia.

## APRONS

Balley-Drake Co., 1120 So. Michigan Ave., Chicago.

## AUXILIARY RIMS

Foley Traction Rim Co., 827 Hennepin Ave., Minneapolis, Minn.

## AUXILIARY STEERING EQUIPMENT

Casco Mfg. Co., Thomasville, Ga.  
Meixell Co., Indianapolis, Ind.

## AXLES (EMERGENCY)

H. G. Paro Co., 1410 S. Michigan Ave., Chicago.

## BALL AND ROLLER BEARINGS

Graham Roller Bearing Co., Coudersport, Pa.  
The Norma Company of America, 1790 Broadway, New York City.

## BATTERY RECTIFIERS

Kentucky Electrical Co., Inc., Owensboro, Ky.

## BODIES

New England Mills Co., 1027 W. Van Buren St., Chicago.

## BODY CLEANERS AND POLISHES

Davies-Young Soap Co., Dayton, Ohio.  
Waxit Mfg. Co., 1539 Plymouth Bldg., Minneapolis, Minn.

## BOOKS

American Technical Society, Chicago.  
H. E. Phillips & Co., Union City, Ind.  
Jeffrey & McPherson Co., Minneapolis, Minn.

## BUMPERS

New Era Spring & Specialty Co., 1152 Hamilton Ave., Grand Rapids, Mich.

## CABINETS

American Bolt & Screw Case Co., Dayton, Ohio.

## CARBURETORS

Marvel Carburetor Co., Flint, Mich.

## CASH REGISTERS

National Cash Register Co., Dayton, O.

## CLEANSERS

States Chemical Co., 680 W. Austin Ave., Chicago.

## CONNECTING RODS

Au-to Compressor Co., Wilmington, Ohio.  
Green Engineering Co., Dayton, Ohio.  
Spencer Metal Products Co., 624 S. Michigan Ave., Chicago. 16 to 24 W. 61st St., New York.

## COVERS

Kennedy Car Liner & Bag Co., Shelbyville, Ind.

## CREEPERS (For Repair Shops)

Foster Bros. Mfg. Co., Utica, N. Y.

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Butler Mfg. Co., Indianapolis, Ind.  
Green Engineering Co., Dayton, Ohio.  
Heiser Special Tool Co., 2001-21 Washington St., Kansas City, Mo.  
Marvel Machinery Co., Minneapolis, Minn.  
St. Paul Auto Cylinder Grinding Co., 1152 Rice St., St. Paul, Minn.  
Storm Mfg. Co., Thompson, Iowa.  
Universal Tool Co., 435 Woodward Ave., Detroit.

## CYLINDER GAUGES

Am-pé-co Sales Co., Marshalltown, Iowa.

## ENGINES

Auto Engine Wks., St. Paul.

## ENGINE CLEANERS

Wagner Specialty Co., 1902 Broadway, New York.

## FAN BELTS

Premier Motor Products Co., 3945 No. Robey St., Chicago.

## FAN BELT GUIDES

Casco Mfg. Co., Thomasville, Ga.

## FIRE FIGHTING EQUIPMENT

Flexlume Sign Co., Niagara St., Buffalo, N. Y.

## FORD COILBOX PROTECTOR

Casco Mfg. Co., Thomasville, Ga.

## GARAGE EQUIPMENT

General Utility Co., 1333 Ogden St., Philadelphia, Pa.  
H. G. Paro Co., 1410 So. Michigan Ave., Chicago.  
Marvel Machinery Co., Minneapolis, Minn.  
Romort Mfg. Co., Oakfield, Wis.  
Storm Mfg. Co., Thompson, Iowa.  
Zinke Co., The, 1323 So. Michigan Ave., Chicago.

## GASOLINE PUMPS AND TANKS

General Utility Co., 1330 Ogden St., Philadelphia.  
Milwaukee Tank Works, Milwaukee, Wis.

## GEARS

William Ganschow Co., 1002 W. Washington St., Chicago.

## GEAR AND WHEEL PULLERS

Premier Motor Products Co., 3845 No. Robey St., Chicago.

## GREASE GUNS

J. H. Haney & Co., Hastings, Neb.  
H. G. Paro Co., 1410 So. Michigan Ave., Chicago.

## HYDRAULIC PRESSES

Lanrie Mfg. Co., Springfield, Ill.

## LENSES

C. A. Shaler Co., 372 Fourth St., Waupun, Wisconsin.

## MOTOR TRUCKS

Mutual Truck Co., Sullivan, Ind.

## OILS AND LUBRICANTS

National Refining Co., 2003 Rose Bldg., Cleveland, Ohio.

## OIL DRAIN COCKS

Casco Mfg. Co., Thomasville, Ga.

## OIL PUMPS AND TANKS

General Utility Co., 1333 Ogden St., Philadelphia, Pa.  
Milwaukee Tank Works, Milwaukee, Wis.

## PISTONS

Am-pé-co Sales Co., Marshalltown, Iowa.

## PISTON RINGS

Balley-Drake Co., Inc. (Sales Dept. for Trione Piston Ring Co.), 1120 S. Michigan Ave., Chicago.

Burd High Compression Ring Co., Rockford, Ill.

Butler Mfg. Co., Indianapolis, Ind.

Ever-Tight Piston Ring Co., 1609 Kingsland Ave., St. Louis.

Fore Electrical Mfg. Co., Inc., 5255 N. Market St., St. Louis, Mo.

General Utility Co., 1333 Ogden St., Philadelphia.

No Leak-O Piston Ring Co., Baltimore, Md.

Ondelick Bros., Leavitt St. and Jackson Blvd., Chicago.

Utility Sales Corp., 808 New Stock Exchange Bldg., Philadelphia.

## PISTON RING COMPRESSORS

Victory Ring Compressor Co., 320 N. Michigan Ave., Chicago.

## PUMPS

The W. H. Howell Co., 10 State St., Geneva, Ill. (Jensen Tire Pump)

Frank Rose Mfg. Co., Hastings, Neb.

Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

## SCHOOLS OF MOTORING

Greer College of Motoring, 1519 So. Wabash Ave., Chicago.  
Milwaukee Motor School, Milwaukee, Wis.

## SHOCK ABSORBERS

W. S. Burgess Mfg. Co., 1323 S. Michigan Ave., Chicago.  
Handy Mfg. Co., Grand Rapids, Mich.  
Philip H. Webber & Co., Hoopeston, Ill. (W. & C.)

## SIGNS

Federal Electric Co., Lake & Desplaines Sts., Chicago.  
Flexlume Sign Co., Niagara St., Buffalo, N. Y.

## SOLDER

Chicago Solder Co., 218 No. Union Ave., Chicago, Ill.

## SOLDERING FLUX

M. W. Duntou Company, Providence, R. I.

## SPARK PLUG INTENSIFIERS

Universal Mfg. & Sales Co., 552 W. Harrison St., Chicago.  
All Spark Ignition Co., 13 Water St., New York.

## SPRINGS

Garden City Spring Works, 2300 Archer Ave., Chicago.  
Harvey Spring & Forging Co., Racine, Wis.  
Jenkins Vulcan Spring Co., 1403 Chestnut St., St. Louis.  
New Era Spring and Specialty Co., Grand Rapids, Mich.

## STEERING WHEELS

Au-to Compressor Co., Wilmington, Ohio.

## TESTING INSTRUMENTS

H. E. Phillips & Co., Union City, Ind.  
Weston Electrical Instrument Company, Newark, N. J.

## TIMING DEVICES

Bird Equipment Co., 324 W. Ohio St., Chicago.  
Calculagraph Co., 30 Church St., New York.

## TIRES

Famous Tires Corp., 295 Babcock St., Buffalo, N. Y.  
Leo McDaniel Rubber Co., Cairo, Ill.  
Miller Rubber Co., Akron, O.

## TIRE PROTECTORS

Coffield Tire Protector Co., 31 Court St., Dayton, Ohio.

## TIRE PRESSURE REGULATORS

Automatic Safety Tire Valve Co., 1765 Broadway, New York City.

## TIRE REPAIR EQUIPMENT

Atlas Auto Supply Co., 630 W. Austin Ave., Chicago, Ill.  
Congo Rubber Co., 406 Olive St., St. Louis, Mo.  
F. M. Duncan Co., 114-116 E. Ohio St., Chicago.

Haywood Tire & Equipment Co., 650 No. Capitol Ave., Indianapolis, Ind.

Stearns Rubber Products Co., 356 W. Madison St., Chicago.

Zinke Co., 1323 So. Michigan Ave., Chicago.

## TIRE RENEWING AND EQUIPMENT

Leo McDaniel Rubber Co., 804 Commercial Ave., Cairo, Ill.  
Miller Rubber Co., Akron, O.

## TIRE TOOLS

Trexler Co., Philadelphia and 2111 Michigan Ave., Chicago.

## TRANSMISSION LINING

Advance Automobile Accessories Corp., 56 E. Randolph St., Chicago.

## VALVES

Romort Mfg. Co., Oakfield, Wis.  
A. Schrader's Son, Inc., 783-798 Atlantic Ave., Brooklyn, N. Y. (Automatic Inflating Valve)

## VALVE GRINDERS

Stenman Electric Valve Grinder Co., 41 Southbridge Ave., Worcester, Mass.

## VULCANIZERS

C. A. Shaler Co., 353 Fourth St., Waupun, Wis.  
Vanderpool Vulcanizing Co., Springfield, Ohio.

## WELDING AND EQUIPMENT

Frank Chas. Owens, 19 No. Morgan St., Chicago.

## WRECKING TRUCKS

Robt. Holmes & Bro., Danville, Ill.

## WRENCHES

Au-to Compressor Co., Wilmington, Ohio.  
The Graham Roller Bearing Co., Coudersport, Pa.  
Sawyer Sales Co., 50 Terminal Bldg., Lincoln, Neb.



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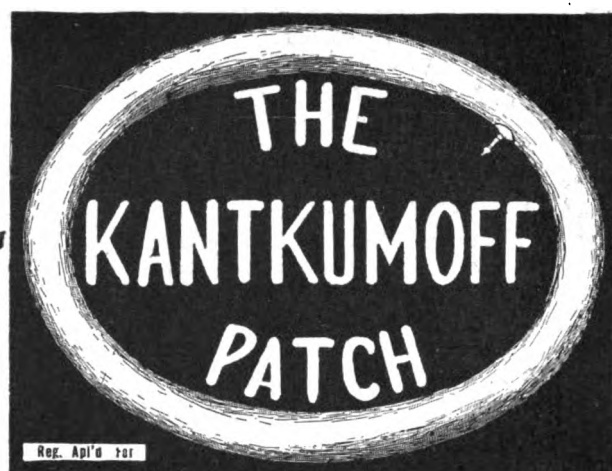
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## The Piston Ring for All Engines

More power with less gas and oil guaranteed

Write for interesting details

**THE EVER TIGHT PISTON RING CO.**  
Saint Louis, Mo.



### A superior patch that makes permanent repairs

On tubes, tops and all other rubber and fabric goods. Can be used equally well for cold patching or vulcanizing. Greatest strength and adhesion—greater profits for the dealer.

Sold in \$1.00 and 50c sizes.

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358 W. Madison St., Chicago

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34 TYPES TO SELECT FROM

Labeled by the UNDERWRITERS LABORATORIES

UNDERGROUND "KANT-LEEK" TANKS - 60 TO 12000 GALLONS

SPECIAL PROPOSITIONS TO JOBBERS

WRITE TO DAY FOR CATALOG "9"

**MILWAUKEE TANK WORKS**  
MILWAUKEE, U.S.A.

## THE ROSE TIRE PUMP

*is the Tire Pump  
Equal to the Task*

The big truck tires are becoming more numerous daily. A dependable Tire Pump is the most carefully selected part of the equipments, that's why 98% of the Truck owners are partial to the **ROSE TIRE PUMP**.

**Over 2,000,000 ROSE TIRE PUMPS**

in use today and but 44 replacements in 1919. The patent valve is responsible for the **ROSE** being the easiest pump to operate.

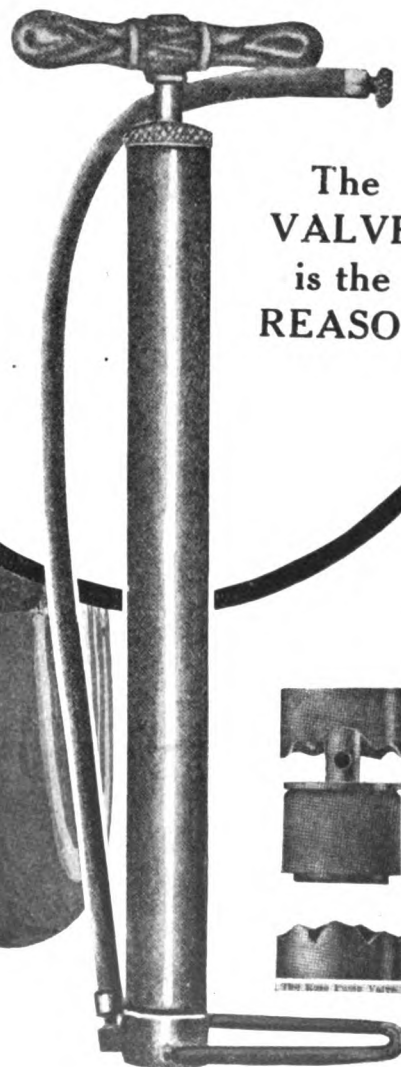
**ALL DEALERS AND JOBBERS**

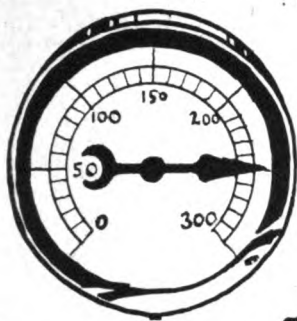
TWO SIZES {  $1\frac{1}{4}$ " all steel construction . . . \$3.00  
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Manufactured by

**Frank Rose Manufacturing Co.**  
HASTINGS, NEBRASKA

The  
VALVE  
is the  
REASON





## Are You Equipped?

Can you furnish air of sufficient pressure for Pneumatic Truck Tires? **SOME JOB!** But you must be able to give these trucks air service if you are going to get your share of their gasoline, oil, repair and supply business. The amount of this business makes it well worth going after. A

## CHAMPION AIR COMPRESSOR

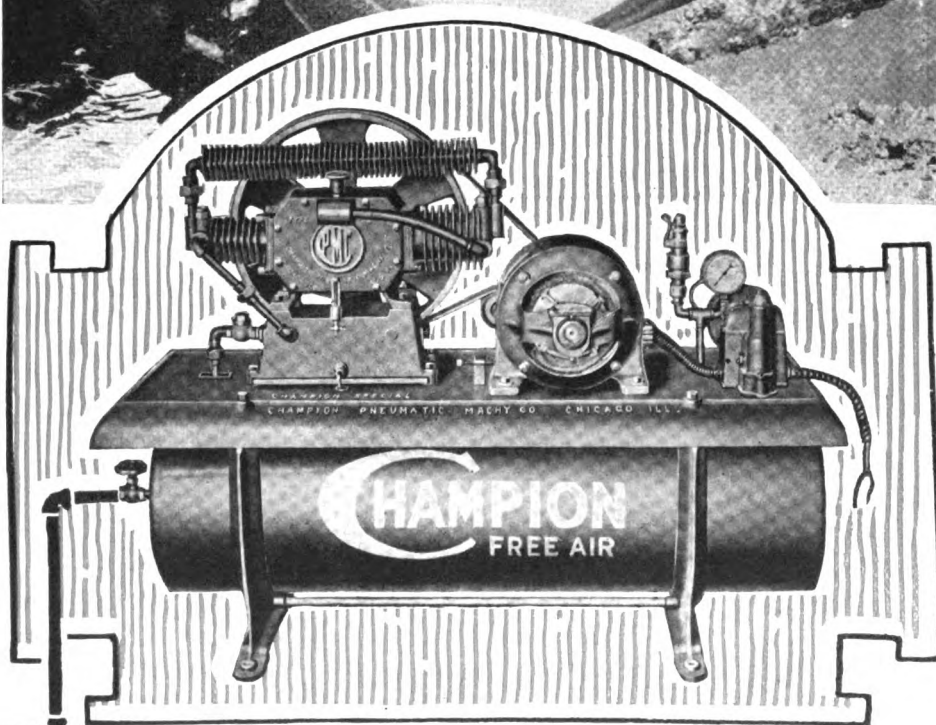
will enable you to furnish the biggest trucks with satisfactory air service. The tank furnished with the Champion Special Automatic Air Unit is tested for 250 lbs. working pressure, affording ample power. The CHAMPION is the fastest two-stage compressor on the market, and at the same time is noted for its low power cost and up-keep. The best of everything in the way of engineering skill, materials, and workmanship is embodied in the Champion.

*Backed by a liberal guarantee.  
Ready for prompt delivery. If  
interested in better air service,  
write for literature*



**Champion Pneumatic  
Machinery Co.**

1402 South Michigan Avenue  
CHICAGO





# Quick Repairs for Every Motorist



## NOKORODE SOLDERKITS

are proving big time and money savers for car owners everywhere. You know that a large per cent of motorists like to tinker with their own cars, and make their own repairs whenever possible. No matter how good the car is, or what the make, there are times each season when the owner needs a drop of solder to improve its appearance or keep it going. A SOLDERKIT is the thing.

With a SOLDERKIT the car owner can make many repairs on various parts of his car, including leaky radiators, cracks on the body, leaks in the gas tank or its pipes, broken connections, on the batteries, and other parts that require soldering. On the road the SOLDERKIT is frequently a "life saver." The roadside repairs which it renders possible avert many a serious breakdown.

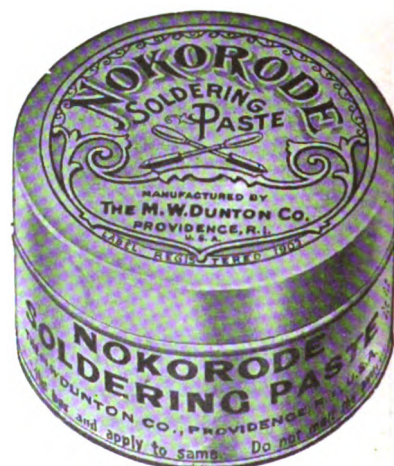
The SOLDERKIT is a thoroughly practical outfit, containing complete instructions for soldering, and the tools to do the work.

***Retails for \$1.50***

There is a big market for the SOLDERKIT among the motorists in your locality. Write today for trade prices and particulars.

### THE M. W. DUNTON COMPANY

PROVIDENCE, R. I., U. S. A.





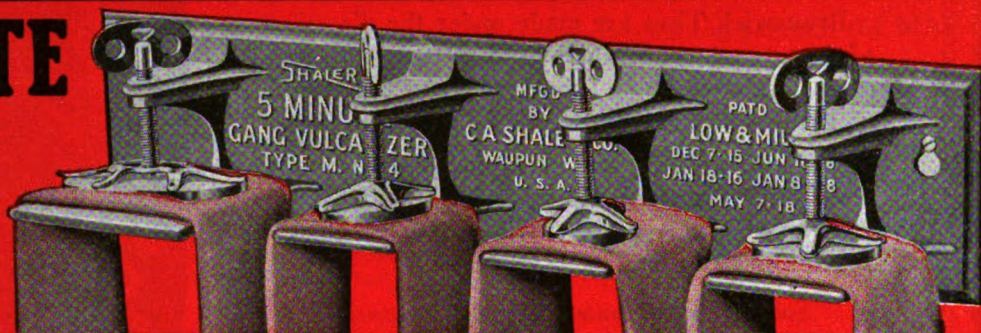
# American Garage & Auto Dealer

Published Monthly  
116 So. Michigan Ave.  
CHICAGO, ILL.

APRIL 1920

Vol. 11—No. 4,  
10 Cents the Copy  
\$1.00 Per Year.

**COMPLETE  
OUTFIT  
\$700**



## Free patches pay for it

With each Shaler 5-Minute Garage Vulcanizer outfit we send **absolutely free** an assorted supply of Shaler Patch-and-Heat Units—enough to more than pay for the complete outfit if you only charge 25c for each repair.

This new gang vulcanizer was especially designed to furnish garages and repair shops with a large capacity quick-action tube vulcanizer that uses the convenient Shaler Patch-&-Heat Units. This is the most popular method of repairing tube punctures.

## **SHALER** Garage Vulcanizer *Makes 4 Repairs in 5 Minutes*

You can obtain garage size large packages of Shaler Patch-&-Heat Units from your jobber at prices so low as to make this the cheapest method of vulcanizing. No gasoline, no blaze, no flame, no trouble, no waiting to heat vulcanizer—and no danger.

**Write Quick—or Ask Your Jobber  
IMMEDIATE SHIPMENT IF YOU ORDER NOW**

Our low List Price, \$10, is subject to 30% trade discount, making the Net Price to you only \$7—and with the outfit we send you Free Patches enough to more than pay for it, so that the outfit costs you practically nothing. Write at once for booklet.

**C. A. Shaler Co., 353 Fourth St., Waupun, Wis.**

Oldest and Largest Manufacturers of Vulcanizers in the World.

ROUND  
PATCH  
1 3/4 INCH

OBLONG  
PATCH  
1 3/8 x 2 1/4 INCH

EX-LONG  
PATCH  
1 3/4 x 4 INCH



# The aristocrat of the tire world

**W**ORKMANSHIP produces no greater quality than the standards and policies of the institution demand. The product is always a true reflection of the house behind it.

The tires which bear the famous name of Brunswick are made in our own factories. The workmen are guided by the ideals that have made possible a world-wide reputation for highest merit.

Brunswick Tires are made under the direction of experts who constantly promote the standards of perfection set up by the founder of the House of Brunswick 75 years ago.

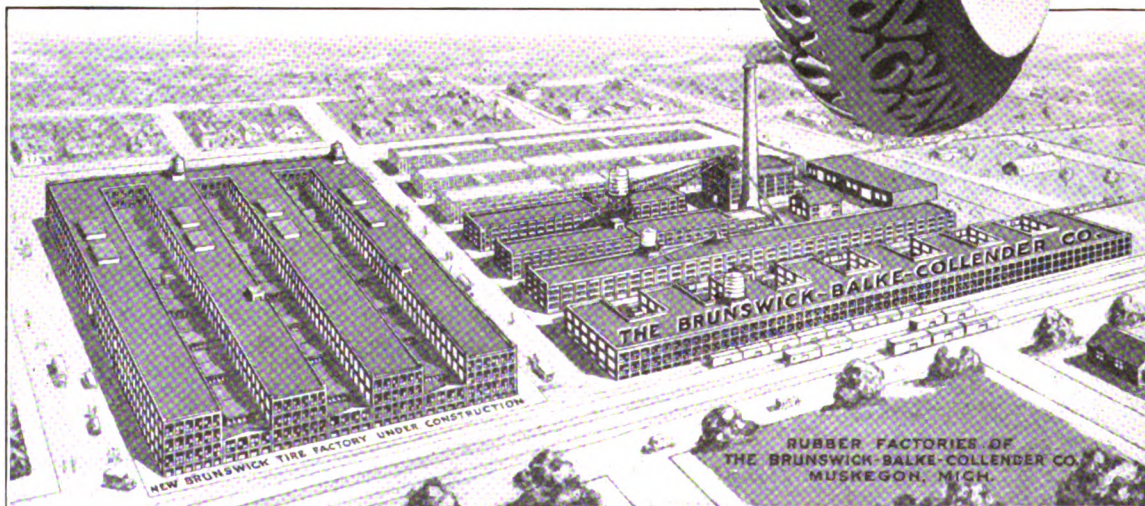
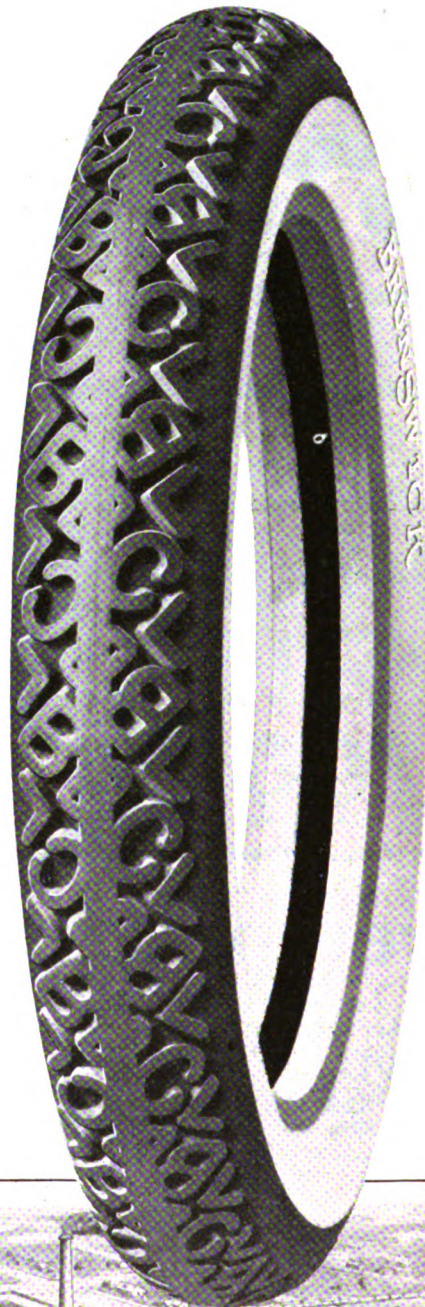
To both car owner and tire dealer, Brunswick Tires offer the utmost in materials, methods and workmanship. It pays to ride on Brunswicks. It pays to sell them.

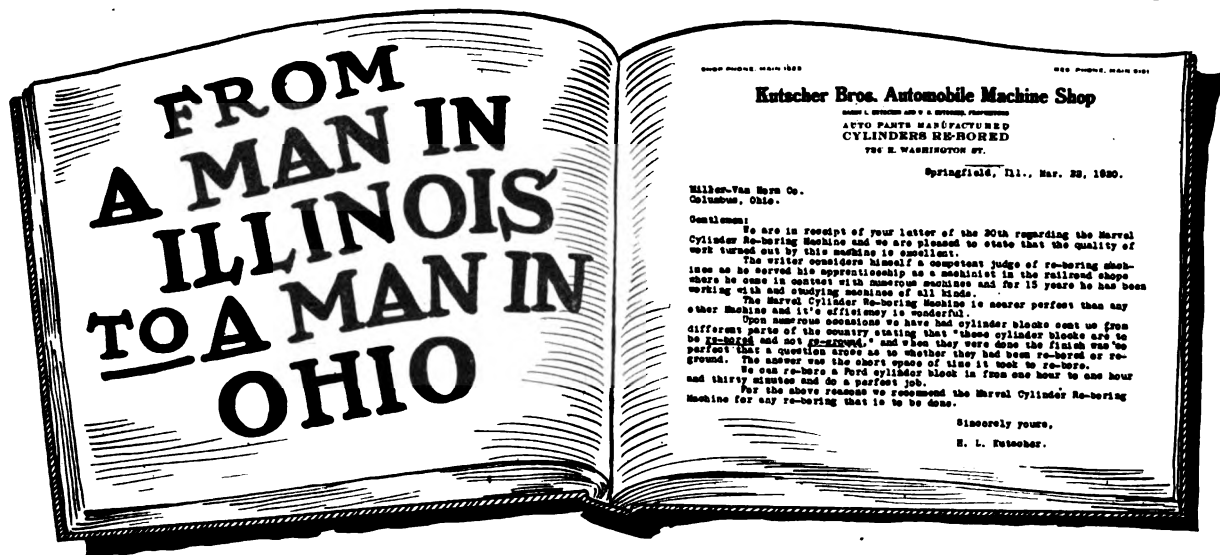
*Sold on an Unlimited Mileage Guarantee*

THE BRUNSWICK-BALKE-COLLENDER  
COMPANY

General Offices: 623-633 South Wabash Avenue, Chicago  
Branches in principal cities of United States and Canada

## Brunswick TIRES





Read what a man in Springfield, Illinois, says to a man in Columbus, Ohio, regarding the MARVEL CYLINDER RE-BORING MACHINE.

We wish that every Automotive Repair man would write to present owners and users of the MARVEL and get their opinions. We are willing to abide by what they say.

## Get First-Hand Information on Our Proposition

Let us send you descriptive circulars of the MARVEL. Permit us to outline our proposition to you and then you write to those who have put the MARVEL to the test. Men interested in building their business and making money—they will tell you what the MARVEL means to them and what it will mean to you.

Over one thousand MARVEL CYLINDER RE-BORING MACHINES are now in use. We will gladly send you sufficient names to convince you that we do not claim half enough for the MARVEL. You'll be convinced that when Mr. Kutscher of Illinois wrote to Miller-Van Horn of Ohio that

### "The Marvel Cylinder Re-Boring Machine Is Nearer Perfect Than Any Other Machine and Its Efficiency Is Wonderful"

He did not exaggerate the profit-making, business-building qualities of the MARVEL, for the MARVEL is the last word in re-boring machines for engine cylinders.

It is endorsed and used by over one thousand schools, colleges and automotive repairmen.

It is power driven, automatic, accurate, speedy and easily operated. All gas engine cylinders look alike to the MARVEL. It will handle anything from a motorcycle to a tractor.

Our Business Service Department will help you get the business—the MARVEL will hold it.

Get our proposition at once. Equip your shop to re-bore gas engine cylinders and fit them with MARCO Over-size Pistons. You'll find this work pays you a handsome profit.

Write today. Get in on the ground floor.

Our Hangers  
in colors attract at-  
tention to your shop

## Marvel Machinery Company

510 Loan and Trust Building

MINNEAPOLIS, MINN.

### THREE OF A KIND—

a combination you cannot afford to pass up:

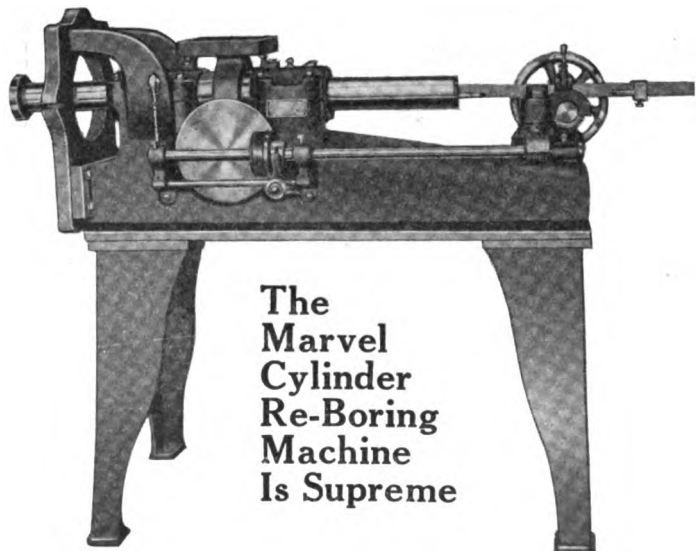
AN EFFICIENT MACHINE.

A PERFECT PISTON.

A SALES-BUILDING SERVICE.



THE SIGN OF A  
PERFECT PISTON



The  
Marvel  
Cylinder  
Re-Boring  
Machine  
Is Supreme



Keep poking away.  
It's Sure to Pay—  
Re-Bore Cylinders Marvel Way





# "NORMA" PRECISION BALL BEARINGS (PATENTED)

"Silence is go'den" might have been written about **"NORMA"** Bearings—for their silent-running qualities are an evidence of that precision of manufacture which minimizes friction and adds to the useful life of the high-grade magnetos and lighting generators in which they are the standards.

See that your electrical apparatus is **"NORMA"** equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# American Garage & Auto Dealer

*Published Monthly*

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116 S. Michigan Avenue, Chicago, Ill.

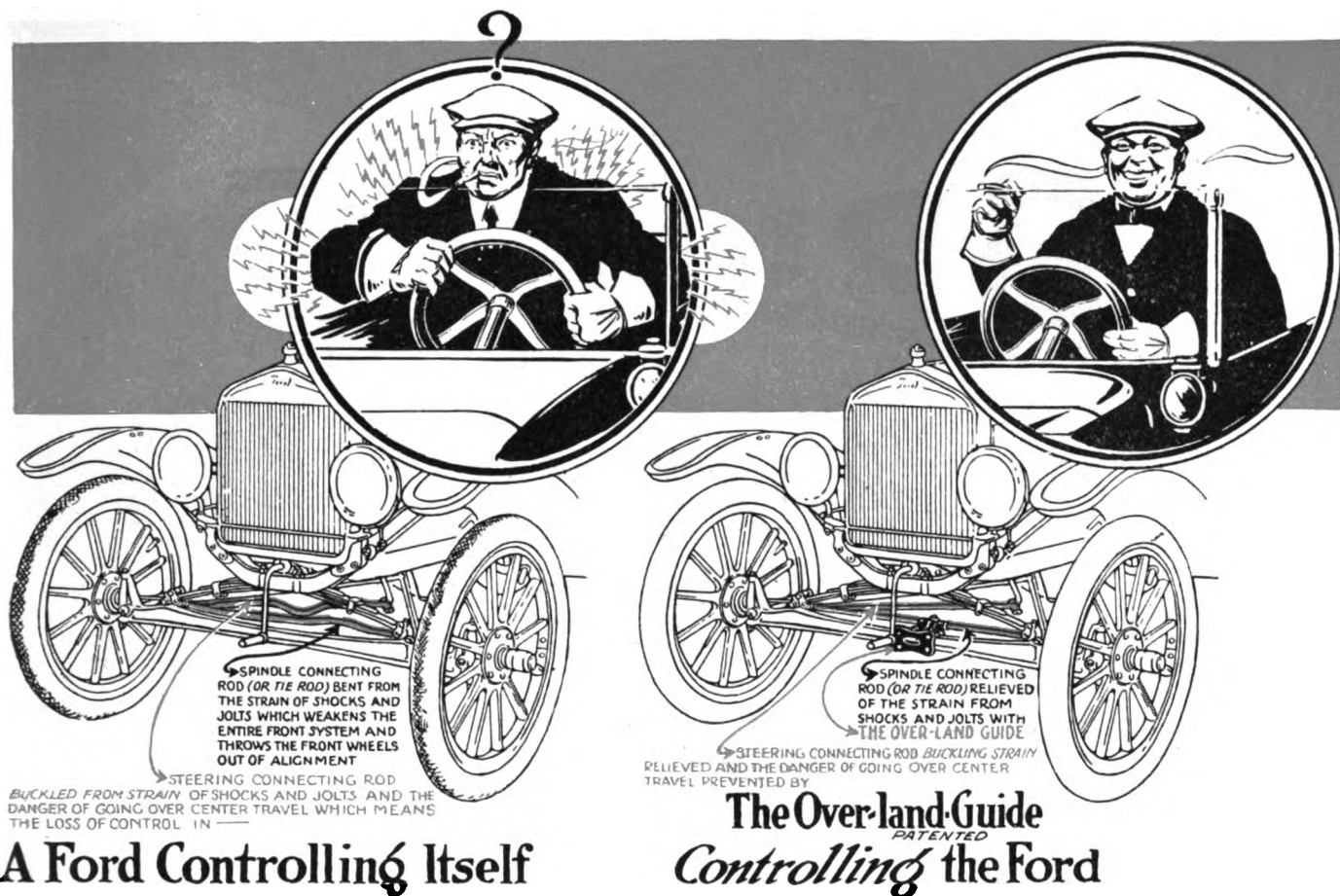
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Entered as second-class matter, March 1, 1916, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879

Subscription per Annum (Postage Paid) \$1.00. Advertising Rates on Request.





## The OVER-LAND Guide Will Do It

When a Ford car or truck is equipped with the Over-Land Guide the driver can steer the vehicle with the tips of his fingers.

Over rocky or hilly roads, through sand or gravel, mud holes or washouts on city streets or rutty country roads the Over-Land Guide will keep the wheels in alignment.

It protects the entire front system and steering mechanism and the steering gears up to the wheel from undue wear and breakage. It will save parts and repairs and insures the longest possible service life of any Ford car or truck.

It will eliminate the danger of ditching and collision with the possibility of fatal results to the occupants and the destruction of the car even though the steering mechanism be broken or fail to work.

There is no danger from a blowout of a front tire even though the Ford car or truck is driven at high speed, as the Over-Land Guide will hold the machine to its course.

The Over-Land Guide stops the wobbling, scooting and creeping of the front wheels. There is no strain on the arms or shoulders of the driver. It does away with the strain and stresses on the steering mechanism. It saves time. It is life and car insurance of the highest order and affords a degree of security that makes it worth a hundred times the cost to any owner.

It is strongly made, neat and compact, requiring no upkeep. It will last longer than the car or truck and always saves and serves. It will not get out of order or fail to operate properly.

**THERE IS NO EQUIPMENT MADE FOR THE FORD CAR OR TRUCK THAT IS MORE PRACTICAL OR NECESSARY. NONE THAT PROTECTS SO MANY PARTS AND SAVES SO MANY REPAIRS. THERE IS NONE THAT ADDS SO MUCH TO SAFETY AND SERVICE. ESTIMATE THE SAVINGS, ADDED EFFICIENCY AND PROTECTION AND YOU WILL AGREE THAT THE OVER-LAND GUIDE SHOULD BE ON EVERY FORD CAR OR TRUCK.**

The OVER-LAND GUIDE protects these parts against breakage, undue wear and repair. Spindle connecting rod (or tie rod.) Spindle body arms and bushings. Spindle body and bushings. Ball and roller bearings and hub. Steering connecting rod and ball joints. Steering gear ball arms. Steering post bracket, bushing and bolts. Steering post. Steering gear pinion. Steering gear drive pinions. Steering gear internal gear case and bushings.

Also helps to keep axle from breaking or bending—and may save the entire car from destruction.

**JOBBER AND DEALERS:**—The Over-Land Guide is a wonder seller. The sales are limited only to the number of Ford cars and trucks in use. Sold under an iron clad guarantee. It is priced right and the discounts are liberal. Write today for proposition and discounts.

## THE MEIXELL COMPANY

216 Board of Trade Building, INDIANAPOLIS, IND.

(Automobile Sundries Co., 18 Broadway, New York, N. Y. Sole Foreign Agents.)

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

**THIS BROAD GUARANTEE PROTECTS USERS OF THE OVER-LAND GUIDE. Send us retail \$8.50 price, and we will send you parcel post, one Over-Land Guide. Use it 20 days, properly installed, and if at the end of that time you are willing to part with it, full purchase price will be refunded upon its return.**



In ordering state the year your car was made.

The OVER-LAND GUIDE bolts to the center of the front axle and the center of the spindle connecting rod (or tie rod), securely relieving the vibration and strain in the spindle connecting rod (or tie rod) and the entire front system, and the steering mechanism up to the steering wheel. Can be attached in a few minutes by anyone.

# BRUNNER

## PERPETUAL MOTION

Some things are impossible, regardless of ingenuity, skill or equipment. Engineers in any line know the limits Nature has established in their field.

Advertising claims or selling arguments which indicate too remarkable performance generally occur where a simple, conservative description would not be convincing.

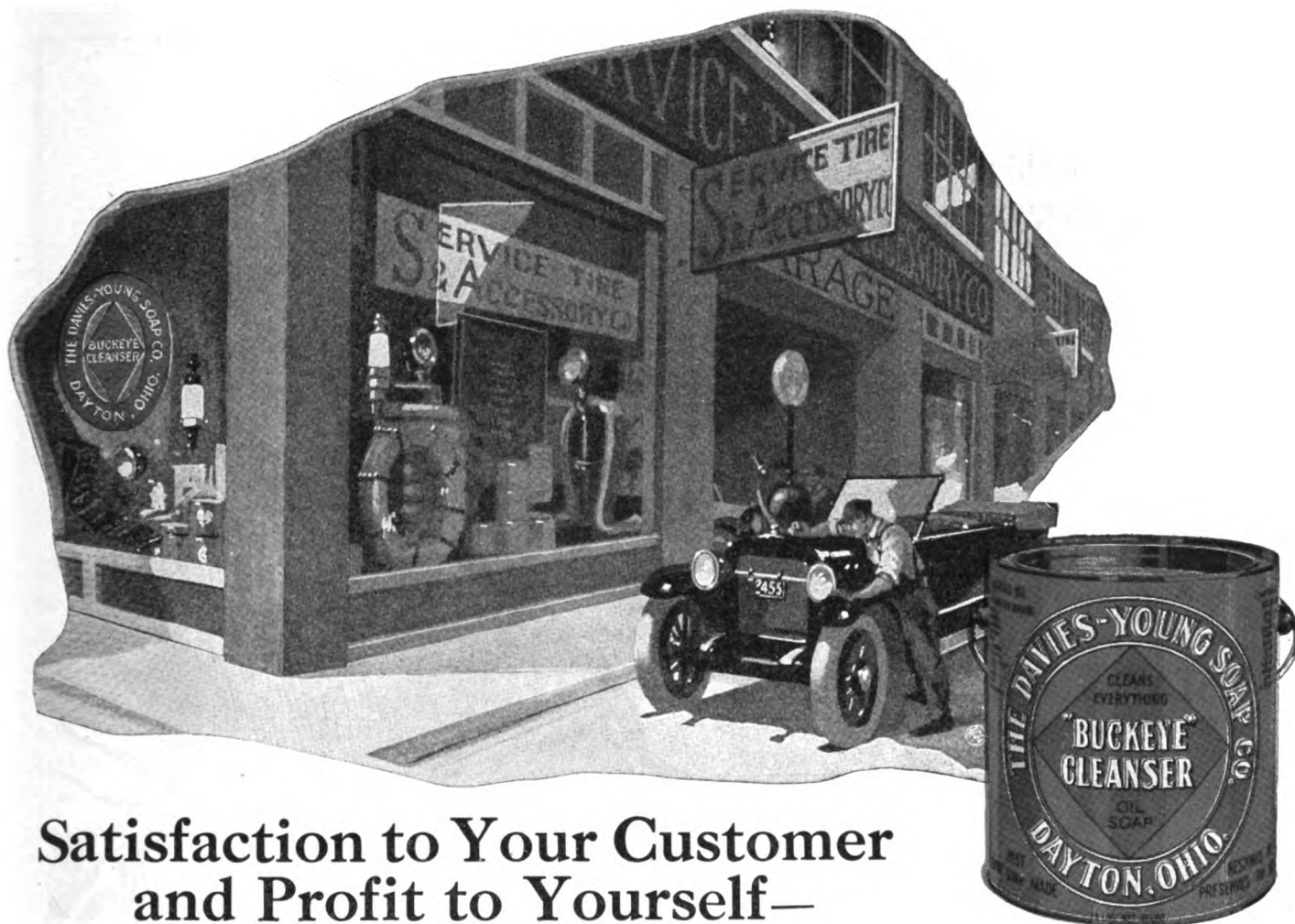
You instinctively deal with the man or company whose every statement is simple and reliable. Any item bought from such a source is apt to be good - - not spectacular but dependable.

**Brunner Manufacturing Co.**  
**Utica, N. Y.**

Cincinnati,  
Ohio.

Kansas City,  
Mo.

# BRUNNER



## Satisfaction to Your Customer and Profit to Yourself—

*that is the experience of the thousands of dealers who  
recommend, use and sell—BUCKEYE CLEANSER  
—the auto soap that cleans and polishes.*

**M**ADE of pure vegetable oil—  
without alkali or grit—that  
acts as a solvent and carries off the  
dirt in a rich heavy lather.

Not only that, but it also pre-  
serves and polishes the finish,  
adding to the appearance—and  
hence, to the value—of the car.

No wonder, then, that a soap  
like this brings satisfaction to your  
customers, and—because your  
customers are satisfied—profit to  
yourself.

Auto supply dealers, general  
stores and hardware stores find  
it a ready repeater.

Ask your jobber for particulars.

**THE DAVIES-YOUNG SOAP COMPANY**  
DAYTON, OHIO

**Coast Sales Agents:**  
Allied Industries, Inc.  
San Francisco  
Los Angeles Seattle

**Denver Sales Agents:**  
Paramount Lubricants Co.  
Denver, Colorado

**Southern Sales Agents:**  
The Colley-Minnich Co.  
Atlanta, Georgia

# BUCKEYE CLEANSER

THE AUTO SOAP THAT  
CLEANS & POLISHES



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

## Nothing like SPEE-DEE

for cleaning greasy, grimy hands. Does its work quickly, thoroughly, and without injury to the skin. You can use it with or without water.

Equally effective in cleaning, automobile bodies, tops, seat covers, celluloid curtains and running gear. Cleans everything—injures nothing.

*"Use it in your shop—  
Sell it to your trade"*

Every car owner will buy SPEE-DEE when you show him what it will do. In addition to automobile work, SPEE-DEE is unexcelled for household cleaning, on windows, woodwork, rugs and carpets.

*Order from your jobber*

**STATES CHEMICAL CO.**

680 W. Austin Ave. Chicago, Ill.



# SPEE-DEE



# American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,  
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XI. No. 4

CHICAGO

April, 1920

## The Firm's Representative.

Has it ever occurred to you how important you are when, by reason of circumstances, you become for the moment the sole agent between the customer and the firm? If it hasn't, in the interests of your own advancement and the company's, you should give it serious thought.

No matter what your position may be, there are times, by no means infrequent, when every employe becomes for the moment the captain of the company's policy, the company's delegate to determine affairs which in the aggregate are important. This occurs many times daily in the relations of mechanics with car owners, service men with complainants, dealers with new patrons.

And just how do you handle affairs at such times? Skillfully, diplomatically, as best serves the interests of the company you are representing? Or do you handle them indifferently, with a sort of "I-don't-care, I'm-not-the-boss" attitude? The difference between the two is the difference between success and failure. The first serves your boss and yourself well. The second is fatal to any future.

Be big! Be as big as any task that comes your way!

## Business Is "Service."

They were talking about business. One of them had been engaged in his particular line for over 20 years. He has a reputation for being conserva-

tive, safe, sound, and successful in his business operations—a good business man in every sense of the word. He was the one doing the talking.

"Do you know," he asked, "what all business is? It is simply service. Our business, for instance, performs a service to the farmer from whom we buy and to the consumer to whom

---

## YOUR COST SHEETS.

"Show me your cost sheets. It is more interesting to know how cheaply and how well you have done this thing than how much money you have made, because the one is a temporary result, due possibly to special conditions of trade, but the other means a permanency that will go on with the works as long as they last."—Andrew Carnegie.

---

we sell. The better our service, the better and more prosperous our business.

"It's all very simple—this matter of service. If our service is good, we develop a thriving business and a good reputation. Naturally we obtain compensation in just the proportion that our service is good."

Fundamentally, the speaker is correct. It is the business man in any line who gives real service for value received who is successful. Service includes many things, particularly in the automotive industry.

It means accommodation, first class workmanship, good value for money received, rigid adherence to promises,

courtesy in all dealings, whether over the telephone or face to face—in fact, it means the adoption of a high standard and insistence upon all employes conforming to that standard.

---

## Horses on Farms.

The U. S. Department of Agriculture in a statement issued this month notes a gradual decrease in the supply of horses on farms and ranches and this decrease is attributed to motor vehicles.

The number of horses shows a decrease of 1.7 per cent on January 1 of this year as compared with a year ago. The average value per head is given as \$94.39 compared with \$98.45 a year ago and \$108.03 ten years ago. Mules have increased in numbers—0.8 per cent—and their average value per head is \$147.10 compared with \$135.85 a year ago and \$120.20 ten years ago.

The data was compiled by the Bureau of Crop Estimates which received the figures from approximately 36,000 crop reporters representing it in all sections of the country. The names of more than 49,000 farmers were reported who used motor trucks on their farms so the conclusion is drawn that the decline of the horse on the farms is not due merely to the use of passenger automobiles.

The extent to which the motor trucks displace the horses is said to be problematical. In many cases the introduction of a truck on a farm indicates provision for increased haul-

ing rather than an actual reduction in the number of horses used. It is said that "coming events cast their shadows before them." This investigation therefore shows the trend of the farmers toward employing machinery rather than horsepower. Evidently the average price of horses is affected by the law of demand and not supply.

### The Meeting of Tests.

Ever since the world was created, mankind has been subjected to tests. The earliest test of which we have record is the famous apple test in the Garden of Eden. And since then many other historic tests have been recorded. The tests which the children of Israel underwent before entering the Promised Land are well known to everyone.

In modern times, tests of many kinds are the foundations upon which are built the laws governing all our developments in science and business.

The automobile came into extensive use only after a most exhaustive series of tests which fully demonstrated its utility. And the development of the automotive industry has been founded upon successfully meeting all the tests which have been placed upon it. At the present time the entire industry is undergoing the severest tests which have been placed upon it—that of meeting the increased demands for cars, equipment and service in the face of shortages of material, labor and shipping.

In the olden days it was customary to apply a novel test to persons whose mental development was considered below normal. A tub was placed under a faucet and the water turned on. When the water began to overflow, the person undergoing the test was brought into the room and a dipper handed him with instructions to prevent the water from overflowing. Upon the proper use of the dipper depended the decision of the judges in the test.

Many in the automotive industry have been undergoing somewhat similar tests, at the present time. Many

of them have met the tests successfully—others are looking wonderingly at the dipper and contemplating how to use it.

There are, we know, many who are vainly using the dipper to prevent the tub from overflowing. They are instituting false economies, cutting down on their service and in other ways endeavoring to prevent the flowing of increasing expenses from the limits of the tub of expenditures over the floor of net profits.

A few years ago the principal concern was the presentation of favorable prices to customers. That is now a secondary matter—the demand is greater than supply, for every automotive dealer has more business than he

Don't try to convince other people unless you are thoroughly convinced yourself. To enlarge, exaggerate, or make inferences not borne out by facts, is to undermine confidence. And permanent business cannot be built on any other foundation than confidence.

can easily handle. Hence the question of service is rapidly coming to the front.

Automotive service to patrons should not be allowed to deteriorate. It is better to have a few real good boosters of your service than a number of disgruntled patrons who stay with you because of force of circumstances. The people demand first-class service and they will pay for it without complaint—but be certain that they are given real service for their money.

### Advertisements as Salesmen.

"Arguments as to why manufacturers and others having something to sell should advertise in the business magazines or trade journals are usually backed up by facts," states an editor of a business paper. "Here is a true story which happened lately in our field," he continued, "and a prospective advertiser whom we had been endeavoring to convince that adver-

tising in our paper would be productive of business, told us that tale as he signed up for a page advertisement in our journal."

Then our friend told us the story of a motor truck advertisement. It was only a quarter-page advertisement, but it brought a sale of a motor truck, despite the fact that other dealers had their representatives right on the ground to talk personally with the buyer—figure up the costs of these two methods of salesmanship.

The paper which this editor represents is one young in years, but it has developed a strong following and its readers are loyal to it—a fact which concerns that had been solicited for advertising had not realized, among them a large motor truck company. There was only one motor truck advertisement in this journal at that time, although many others had been asked to utilize its pages.

One of its readers was about to purchase a motor truck, and one which would cost considerable, as the man wanted it for a specific purpose. He found the one advertisement in his favorite trade paper and then he sent for information. Other motor truck men learned he was in the market and sent their salesmen to see him. But they were told that their truck was not advertised in the trade paper which he thought was the best in the field—therefore he would buy the truck from the manufacturer which supported his paper.

The moral which the large motor truck company drew from the incident was this: "It pays to advertise—every issue. The time the ad drops out is the time the buyer drops in."

There are many concerns in the automotive industry which have been invited to advertise in the AMERICAN GARAGE & AUTO DEALER, but for various reasons have not done so. We wonder if they will not eventually encounter loyal AMERICAN GARAGE & AUTO DEALER readers who stand by those manufacturers who present the merit of their goods through its advertising columns.

# How L. A. Morgan Co. Handles Repairs

System, Tempered with a Human Understanding of Automobile Owners, Is the Keynote of This Shop—There Are No “Hit and Miss” Methods Employed—Every Car Is Given Definite Attention and Careful Inspection

The Tools of System Shown in This Photograph Are Essentially Responsible for Mr. Morgan's Striking Success in the Automobile Repair Business.



At the Extreme Left is the Stock-room Window, to the Right on Photograph the Shop Order Rack, and to the Extreme Right is Time Card Rack and Time Clock.

In last month's issue we narrated the story of how L. A. Morgan on his week's salary started in the repair business and how his policy of giving a dollar's worth of service for a dollar established a business which, in a little more than three years, twice forced him to move to larger quarters and which this coming year will amount to at least \$100,000.

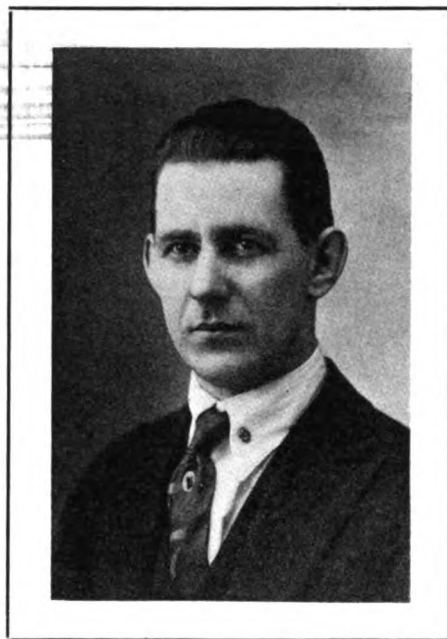
While primarily his rigid business policy can be given as the reason for his striking success, nevertheless, his methods of shop management were big helping factors.

Just as Mr. Morgan believes in squareness as the foundation of service, so he had found that service cannot be square unless it rests on method—and method depends on ability and co-operation. In this respect, Mr. Morgan says:

"I pay my men more money than any other firm in town, or in the vicinity, in order to get experienced men, men who are interested in the business, who pull with me; men to whom a mistake means just as much as one does to me and who strive just as hard as I do to rectify it.

"I believe in being on equal terms with the boys. I call them by their first names and they call me by my first name. In this way we are on an equal basis and they feel free to offer any suggestions which they think would improve the efficiency of the shop.

"The foreman I have trained to put



"Morgan—the Dodge Man."

himself in the customer's shoes, to feel with him and recommend that which he himself would have done if it were his car.

"When a customer brings his car in for repairs, he does not, as a rule, know what is wrong with it. This foreman goes out with the owner and rides in the car, diagnoses its condition and suggests the minimum amount of repair which would put that car into satisfactory condition.

"If a customer drives in with a car and desires certain repairs which in our opinion are not necessary, we tell him frankly what is necessary and

suggest that he have those done. Should he desire repairs done to his car which we believe would not be satisfactory and would put his car in very little better shape, and the sum paid for the repairs will not relatively improve the car, we recommend that he take his car somewhere else. It is not our wish or desire to have any job leave our place which is not first class and which we cannot stand behind.

"In this way, we have installed confidence in the car owners and, as a result, a great many of them now come and say: 'Fix it! I don't know what's wrong with it.' And they leave it to us to do what is necessary."

It may be of interest to repeat that Mr. Morgan's shop is 60 ft. by 100 ft.—of brick construction, well lighted and ventilated. The office is situated in the front right-hand side of the building. The battery charging room is in the front left-hand side, and directly back of it is the stock-room.

The stockroom is in charge of a man whose duty it is to issue all the necessary parts and tools upon presentation of a stock requisition, O. K.'d by the shop foreman or superintendent.

The general repair shop is equipped with lathes, drill presses, emery wheels, grinding and reboring machines, electric drills, air hammer, welding outfit, and special labor-saving devices. Last summer 24 men

were employed, but during the past winter only 18.

At the stockroom window is a job card rack and next to it a clock which is used for punching each man's pay-roll time card and also for punching in and out on each individual time ticket. This latter time is charged against each particular job.

"The shop opens at 8 o'clock and

closes at 5:30," Mr. Morgan told us, "and appointments are made as they are at a dentist's office. In special cases when the work is dragging along or conditions indicate that work will not be finished as promised, additional men will be put to work on the car. When a rush order comes through for a doctor or salesman, men are placed on different parts of the car

and the work will be snapped through in the same day."

Then Mr. Morgan went on to say: "Special tools are used wherever we have found that they save labor and time. If there is no tool for the purpose, one is made to fit the job."

After the shop superintendent makes a complete inspection and diagnosis of the car he, or anyone else who happens to be taking his place at the time, writes out the shop order as shown in Fig. 1, listing the work to be done and when it will be completed. The customer signs his name under a statement which frees the company from any liability for fires, accidents, theft, or collision, and that cars are tested and operated at owner's risk.

Each man on a job punches his time "in" and "out" on a time ticket as shown in Fig. 2, lists the job number and full description of all work done, material used, and condition of parts.

The daily time ticket shown in Fig. 3 is used to figure the pay-roll on a weekly basis. On this card is a space for each day and also a place for overtime.

The working day automatically stops at 5:30 p. m. Should a man for any reason be called upon to work overtime, he uses the space for overtime, ringing "in" at 5:30 and "out" when through. The week ends Thursday night and each man's time is figured on Friday morning and payment is made on Saturday. The man signs his name on the time ticket before receiving the money. This card then serves as a receipt for the wages paid out.

The shop order has a white manila sheet attached on which the girl copies on the typewriter the work wanted. This card, 6 ins. by 9 ins., shown in Fig. 4 is white-shellaced to prevent it from being soiled. The card is then placed in a leather envelope with a celluloid front and attached to the car.

The shop superintendent has a notebook in which is listed all of the work in the shop, what is to be done, and when the work is promised. In this way he is able to estimate how soon any new work can be turned out and promises the customer accordingly. In the shop he assigns men to the work and examines each job every 15 or 20 minutes, punching each job card as soon as the work is finished. The punch marks are shown in Fig. 4.

Reg. No. <u>14604</u>	Repair Order No. <u>5657</u>
Date <u>Dec 15-19</u>	Milage <u>7586</u> Gal. Gas <u>9</u>
<b>L. A. Morgan Company</b>	
Name <u>Dr. Clarence Crane</u>	Res. Phone <u>1684 Nat</u>
Street <u>Dover</u>	Bus. Phone <u>B136220</u>
Town <u>Mass.</u>	Bus. Address <u>520 Beacon St.</u>
Make of Car <u>Dodge Tour.</u>	Promised <u>Friday 2:30</u>

---

Claim Tag No. 8691 DO THE FOLLOWING WORK

---

Grind valves clean carbon  
clean carburetor  
clean & adjust ignition  
Replace universal joint  
Reline foot brake  
Reline hand brake  
Replace broken gears in  
diff. & repair

---

After above work is done  
Road test & report general condition

---

**TERMS CASH**

---

The above work is to be done on my car with the understanding that L. A. Morgan Company is not liable for accidents, fire, theft or collision. Car tested and operated at owner's risk.

Cl. Crane  
 Signed

Fig. 1—The Office Shop Order on Which is Written Work Which Has to Be Done to Car—Owner Signs This Order, Thereby Giving Authority to Do the Work and Freeing the Company of Any and All Liability While the Car is in the Shop or Under a Road Test.



[illegible]

Fig. 2—Time Ticket on Which Each Workman Lists the Job Number, Full Description of Work, Condition of Parts and the Time Work Was Started and Finished on Each Car.

When any new parts or supplies are needed for the work being done, the foreman makes out a stock requisition as shown in Fig. 5. This requisition has a place for the date, the repair order number, name of car owner, by whom material is delivered, and by whom received.

These requisitions are numbered by

an automatic duplicating machine at the stockroom, the number being stamped on both the requisition and on the manila repair order. This enables the office to check the requisitions against the repair order and makes certain that none is missing. The requisitions and individual job tickets are deposited in the small box un-

der the shelf at the job rack and are collected by the bookkeeper four or five times a day.

The parts listed on the requisitions are then entered on the reverse side of the original shop order as shown in Fig. 6 and all placed in a manila envelope.

If requisition, as listed on the shop order, cannot be found, the girl goes to the stockroom and gets a duplicate. When the repair job is completed, it is turned over to the tester who takes the car out and gives it a thorough road test, recording on the

[illegible]

**Fig. 3—Daily Time Ticket.**

reverse side of manila shop order the condition of the car.

Should this road test show that there are a great many things which  
(Continued on page 44)



**Corner of Machine Shop Equipped to Handle Automobile Repairs.**



**The Stockroom Arranged to Quickly Distribute Materials and Tools.**

# Why Not Put In a Bargain Bench?

It's Not Really a Counter, Just a Bench Located Where the Eye of Your Customer Will Casually Fall on the Tempting Display—What Is Sold on This Bench?—Everything, Almost!—One Garageman Has Found It Pays

By Harry Botsford

There's a garage manager in a certain Pennsylvania town who says that he can make his accessory business move, and move fast. I know what his stock turnover is, and I know his sales are active every day in the year. One of his best sales plans is a bargain bench.

It's not really a counter, although it is as high and just as convenient as a counter. It is located in the center of his salesroom and showroom. It's right where the eye of the prospective purchaser will casually fall on the tempting display.

A sign is placed above it carrying this question:

*"Can you use any of these at special prices?"*

The sign and the display certainly make added sales.

What does this garage sell on the bargain bench? Everything, almost! The day I was there, I found several wrenches of various styles, some vulcanizing cement, spark-plugs, oil measure, runningboard mats, sponges, headlight bulbs, tools, air-pressure gages, top dressing, graphite, etc.

The usual goods placed on the bargain bench, the manager told me, were goods which failed to move fast when shown with the regular displays. Such goods were placed on the bargain bench and marked down to a price which would still leave a reasonable margin of profit.

Now no one is a better shopper than the average car owner and as soon as the ordinary motorist sees that sign

he begins to look over the articles displayed. He will, no doubt, find something which will make him reach for his check book. The price being low, also appeals to him.

The manager told me that by using the bargain bench he is able to keep all of his accessories moving. He says the bargain bench has made him a

opened a car of automobiles consigned to him, that the car contained only rock salt.

## Operates Garage Through Violating a Building Restriction.

Where a 10-car garage had been built and operated for three years without objection, though violating a building restriction, the court below properly refused to order its discontinuance, as one who would enforce a building restriction by injunction must act promptly, but permitting the operation of that garage, would not preclude plaintiffs from invoking equity to prevent the operation of a larger one.

Equity may restrain as a nuisance the operation of a public service garage in an exclusive residence section, aside from any building restrictions.—*Hohl v. Modell*, Supreme Court of Pennsylvania, 107 Atlantic 885.

## Three International Automobile Shows to Be Held in Belgium.

Three international exhibitions of automobiles and accessories will be held this year at Antwerp, Belgium, on the occasion of the International Olympic Games which are expected to draw a large crowd of visitors to Antwerp from practically all over the world.

The first exhibition will take place from May 15 to June 13; the second, from June 26 to July 25; the third from August 7 to September 15.



A Bargain Bench Which One Dealer Has Found Very Profitable.

large number of friends and steady customers. People have formed the habit of coming into his garage and looking for bargains, knowing they will find some on the bench.

I forgot to mention that this is all cash business; every bargain offered is offered for cash only. This adds to its value.

If the bargain bench pays out in a town of 15,000, why would it not pay out in your town? Could not the idea be adapted to any garage in any town?

I believe the bargain bench will add another member—and an inexpensive member—to the sales force of any garage. It's worth trying.

## An Automobile Consignment, Like Lot's Wife, Turns to Salt.

It must have been a surprise to Lot and the rest of the family when Lot's wife turned to a pillar of salt. But it was no more of a surprise than that experienced by E. T. Hogan of Sheridan, Wyo., an automobile dealer, who found recently when he

Don't wait for the spring to be gone before you begin to make your advertising and selling plans. Look ahead. The man who looks ahead seldom has a lean bank account.

A nice degree of courtesy is just as necessary with you toward those who are associated with you in a business way as toward customers. Friends are always an asset.

# Building Tomorrow's Sales Today

The Time Is Coming When It Will Be Easier to Get Cars Than Buyers—The Real Salesman Is Planning Now—How a Course of Instruction in Driving May Be Made a Source of Present Profit and a Potential Business Builder

By C. L. Funnell

One of the most interesting things about selling motor cars next year, or the year after, is the certainty that the time is coming when it will be easier to get the cars than the buyers; when supply will once more nose out the demand. And the real salesman is the man who is planning now for the conditions which he knows will come later.

Anyone can sell a car to a man who walks into the garage with his checkbook in his hand and a license application sticking out of his coat pocket. The only difficulty is to get the car to sell him. And now, when the business does not require a high pressure of selling effort, is the time to pave the way for the days when the silver-platter sales will have passed and it will be necessary to work—and work hard—for every order.

One way to intrench for the coming campaign is to establish an instruction course in motor car operation for everyone in your territory. You have some used cars that are

sometimes rented out. When they are standing idle on the floor, they are costing money. Teach your neighbors how to drive them, and make them pay the rent!

Every American ought to know how to drive a car, just as everyone ought to know how to swim. The automobile is as much a part of our daily national life as the sewing machine, the egg-beater, or the phonograph. Knowledge of what makes the automobile go and how to operate it safely should be as universal as the information about household inventions.

The high school or finishing school girl wants to know how to talk clutches and carbureters with the people she meets. And she would delight in being able to tell about how she drove a six-cylinder car on high up

Perhaps the simplest way to offer the plan is to establish a course of ten lessons—each taking one-half hour on the road with one of your cars and an instructor—for \$25. This allows you \$2.50 per half-hour, and will probably cover your

costs with some margin of profit. This price can be increased if desirable, but it should be borne in mind that the value of the plan as a whole lies not so much in making a profit on the lessons as in awakening motoring enthusiasm in the minds of a large number of people who have never driven before.

The lessons should be offered so far as possible at hours to be chosen by the customer. This proves a big selling point. When you tell a customer he can take his lessons at any time between 7 a. m. and 7 p. m., you have swept away one excuse for not signing up. He can't say, "I couldn't get away at that time."

When a customer signs up for ten lessons and pays in advance, it will probably be found

convenient, to hand him ten cards, each entitling him to one-half hour's driving lesson. Single lesson cards may be sold and, if a charge higher than \$2.50 is made for single lessons, it will help to sell the ten-lesson course.

In your territory there are dozens of families that can afford a car, but they have never made up their minds to own one. Why? Because they've never felt the thrill of a snappy pick-up with the steering wheel in their own hands and the accelerator under their own toes.

Did you ever watch a new owner

## YOU DON'T HAVE TO BUY A CAR TO LEARN HOW TO DRIVE

You can learn to drive a motor car in a very short time.  
And you need not own a car to do it.

We supply the car and a competent instructor and in a series of pleasant half-hour lessons we can teach you how to handle a car correctly.

Every American ought to know how to drive a car. You have no idea when the time will come when this knowledge will enable you to save a life.

You owe it to yourself to be familiar with the motor car, for it is one of the very greatest of our modern inventions. You understand the sewing machine and the phonograph. You should be equally familiar with the automobile.

Our classes are now forming, and you can secure your choice of lesson assignments by calling at our office.

**HOMEDALE AUTO COMPANY**  
**INSTRUCTION DEPARTMENT**  
**Phone: Homedale 45**

Fig. 1—This Shows How You Can Advertise Your Instruction Course in the Local Newspapers in a Space Two Columns Wide.

"that steep hill out on the State road."

Every boy wants to drive. And every member of every family where there now is a car should be able to operate it. But it's the people who have no car, and have never owned one that will be more valuable to you, and the people who, when properly cultivated, will prove the nucleus of tomorrow's sales.

So there's a real market for driving instruction! You have any number of good appeals upon which to base advertising in your local newspapers. In Fig. 1 is shown just one example of how this might be approached.

as he finds he can hold his car to a straight course? He grins from ear to ear. He has found a new joy that he never knew existed. You can not describe the "feel" of a car to a man

As an adjunct to the driving course it is easy to establish a course of lectures to be given once or twice a week. These lectures may be given by a member of the mechanical or

6. Clutches and transmissions.
7. Steering gears and axles.
8. Brakes.
9. The how and why of good driving.
10. Keeping the car in shape.

Teaching beginners to drive can be reduced to a fairly definite system. A man who has tact and patience will find that he can make a passable driver of the average beginner in ten lessons. Of course, the biggest thing for the new driver is practice. But it is essential that he should have expert guidance when he begins his driving career so that the habits which he forms will be good ones.

Perhaps, the simplest beginning is to take the student out on a level road and stop the car. The student is then placed behind the wheel and the instructor operates the pedals and levers, leaving the beginner nothing to think about except steering.

Care should be taken not to tire the student with details—let him feel the keen pleasure of driving as much as possible. Rightly used, the instruction plan will build up for the local agency a list of real motor enthusiasts who sooner or later will sign a contract. And in the days to come when cars will again be plentiful and buyers will be scarce, the list of former driving and lecture student will prove a fertile field.

### INSTRUCTION CARD

Name .....

Address .....

Telephone No. ....

Do you, or any member of your family own a car? ..... Make ..... Year .....

Started Course ..... Finished Course .....

Remarks .....

.....

Fig. 2—This Card Should Be Filled Out by Each One Enrolling in the Instruction Courses—If They Do Not Own Cars, They Are Prospects—If They Are Already on the Owner List, Then They Are in the Market for Tires and Accessories and Service.

who has never driven. He has nothing in his own mind that responds to the impressions you try to create. Such men and women are the people you want to reach through your instruction course.

When a man enrolls for the course, have him fill out a card like that shown in Fig. 2. If the student owns no car, and there is no car in his family, his card ought to go into your prospect file. The instructor can note under the remarks his own idea about what type of car would appeal to the prospect. These cards will form the basis of a fine mailing list.

As soon as you receive information on your new models you can write a letter to each of these prospects and tell him that you know he will be interested in a new model. Tell him about its rear axle and what sort of clutch it has, tying this information with his lessons.

For the people who take the course, who already have a car in their families, you can make a lower instruction rate if their own cars are used. These people also form a valuable prospective mailing list for they are in the market for:

1. New cars.
2. Tires.
3. Seasonal overhauling.
4. Home garage fittings such as tire pumps, vulcanizers, oil tanks, etc.
5. Usual motor car accessories for everyday use.

sales force and may well deal with the general construction and operation of the car, or may be sent through the mails in printed form. Such a series of lectures might be divided into ten sessions, as follows:

1. Gasolene engine principles.
2. What the carbureter does.
3. Ignition.
4. Cooling systems.
5. Lighting and starting systems.



A Progressive Community in California Solved Its Garage and Banking Problem by Combining Both in One Building—An Eye for Business, Say We, for Where There Are Automobiles There Are Money—Have It in Mind When You Build Your Garage—This One Is Designed Along the Old English Architectural Style—the Front Is of Marooned Tone Tapestry Brick—The Garage Has a Capacity of 40 Cars and the Sales Room Is Large.



# "I Bulieve in Pluggin for Our Garaje"

"Say What Do You Think of a Feller That Don't Care Ennything About His Garaje Getting Bizness?—If Ime Working in a Plase, Im Going to Do Everything I Can to Help That Plase Get Bizness—Ime That Way, Pete"

By Frank Farrington

Deer Pete:

Wel I got a raze and I diddent ask for it. Friday nite I started for home and I forgot a book I wanted to taik with me. Ide left the boss and Dazie ballansing up the munny. Sum ballansing act too, Ile say. I kno becaws when I went back the ballansing was going on. The boss was sitting on the casheers chare ballansing Dazie on his knee.

I pertended not to see ennything, but I cood see they unballansed rite away. I got my book and went out and never sed a word. The next nite when the boss pade me he sed, "William, you're doing so wel and you hav such good sents about keeping your mouth shut about things that happen around the plase that Ime going to raze your wages and there's a wekes back pay in the envelop."

I says "Thank you. Ime doing the best I kno how about keeping my mouth shut and my eyes too. Ime much obliged." But I suppose I can rite it in a letter confidenshully, hay, Pete?

I gess I ern a raze tho becaws Ive bin pluggin for our garaje laity to beet the band. You see theres always sum new familys mooving into our town. It aint a ded berg like yourn, Pete, and I thought it wod be a good plan to get those new familys that hav automobile to cum to our garaje when they want gas or ennything.

So we had a bunch of stix to meazhure how much gas there is in your tank and they hav an advertise-ment on the back of em. And we hav sum callenders too. And when

Ide go out on enny errand, Ide taik sum of thozе and when Ide see a new family mooving in, Ide stop and leev em a stick and a callender and tell em which is the best garaje in town and thats ours and theyd ask where it was and then I tel em all about it. And we had sum other advertising stuf bout tires and accessories from manu-facturers and Ide leev sum of that.



"It Seemed to Me Our Door Diddent Open Any to Eezy."

Wel, I notist that a good many of those fokes did cum to our plase for gas becaws I was rite out there, and when they cum I remembered em and that made em feel good and want to cum again, and Bob notist that I new sum of these fokes heed never sene before and he askt me about it and I told him how it happend. You see Ide bin doing this on my own hook.

Wel, after Bob and I was talking about it, he told the boss and the boss thought it was grate stuf and he told me to keep it up and heed get sum kind of an advertising sooveneer to give em that wood be better than the stix and callenders and the callenders was all gone ennyway.

So the boss got a map of our town

and the rode around it and put our name on it and I give em that now and they like em fine. And I give er a packig of advertising stuf from manufakturers too. Ile bet there aint menny new familys cum to town now that dont cum to our garaje.

The boss has Dazie watch in the newspapers for names of fokes mooving into town and he finds out about em enny way he can. Then I get rite on the job.

I had to go over to Dunnings garaje today to get sum-thing and Ive forgot what it was. When I went in their dore, the dore stuck so I coodent hardly open the blaim thing. I wun-dered why they did-ent fix that dore so a customer cood get in without an ax. It was the offis dore I mean.

When I got what I was after and went back it seemd to me our door did-ent open enny too eezy. I woodent hav

thought about it if I haddent just bin thinking about Dunnings dore. So after I give Bob the stuf he wanted I went back and tride our offis dore agen. Buleve me, it opened hard as Dunnings just about onlie I never notist it becaws I go out and in all the time and Ive got used to givving it a big push. What dyou kno about that? There I was kicking about another store dore when our own dore stuck like it was naled fast.

Persy was the first one I saw after I tride that dore. I askt him, "Persy did you know our offis dore sticks so I cant hardly open it?"

"I shood worry," he sed. "If you cant get in the dore, stay out or cum in the window. I aint so shure the

(Concluded on page 48.)

# Practical Hints for Shop Mechanics

Conducted by E. C. Pohlmann

## Using Scrap Babbitt.

I have found a use for scrap Babbitt which accumulates around the shop that may interest some of the readers of the AMERICAN GARAGE & AUTO DEALER.

Melt this scrap Babbitt, run into a burning lead mold, and use it for soldering where a hard solder is required, as on certain places on a radiator.—A. T. S., Ill.

\* \* \*

## Replacing Transmission Bands.

The other day while putting on Ford transmission bands I found a use for the slow-speed drum of the Ford transmission.

The old slow-speed drum is clamped in a vise, then the new lining which is to be put on the transmission band is laid around this drum. The band is then put over it and pulled tight by means of a screw put in the clutch fork.

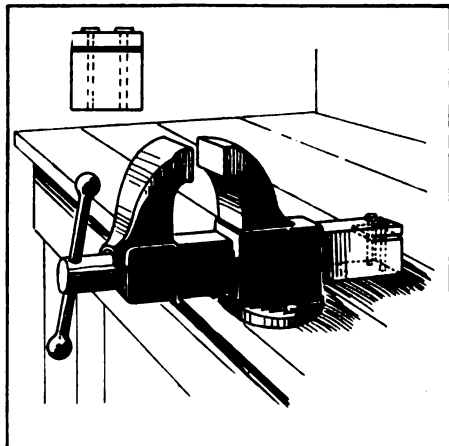
The transmission band rivets can now be driven through the band and clinched on the drum. In this way a set of transmission bands can be put in in about a tenth of the time that it takes by the old way.—A. T. S., Ill.

\* \* \*

## Punch Press.

One of the handiest devices I have in my shop is the punch press on my vise. I sawed a slot  $\frac{3}{32}$  inch wide in the sliding bar of the vise. Then I drilled two holes through the top  $\frac{3}{8}$  inch and  $\frac{7}{16}$  inch, respectively. Into these holes I fitted two punches with heads, as shown in the accompanying illustration, to prevent them from falling through.

This device is very useful and a big time



Handy Punch Press.

saver when punching holes in shims for bearings, also for punching holes in gaskets. I find  $\frac{3}{8}$  and  $\frac{7}{16}$ -inch holes are most useful. But any other sizes can be substituted.—E. M. D., Ind.

## ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

## Cleaning Upholstery.

The depressions in studded upholstery catch all sorts of dust, crumbs and other articles which cannot be removed with an ordinary brush, because it is too wide to enter the depressions. Neglect of these centers of dust collection soon results in slovenly looking upholstery.

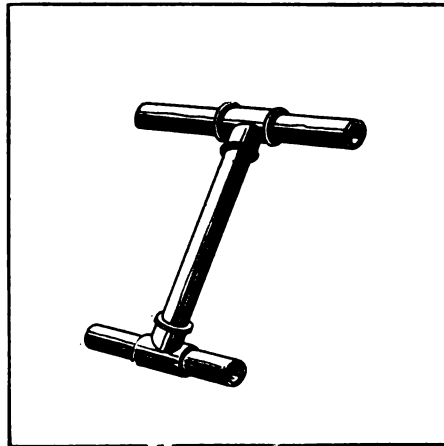
It is worth while to buy a  $\frac{3}{4}$ -inch paint brush with bristles shaped to a point. Such a brush will easily clean out the dirt around the studs.

\* \* \*

## Device for Lapping Pistons.

A very handy device for lapping in pistons and rings can be made from old pipe fittings as shown in the accompanying illustration.

Use only two tees and three short



Lapping Device Made From Old Pipe.

pieces of pipe large enough to hold the wrist-pin of the piston to be lapped. Saw off the ends of the lower tee to better enable it to fit between the piston bosses.—E. M. B., Ind.

## Heating Babbit.

Babbit is often ruined by overheating. To prevent this, heat the babbitt until it just scorches a pine stick.—P. C., Ill.

\* \* \*

## Rattling Brake Rods.

Annoying brake rod rattles may be quickly, cheaply, and permanently silenced by the simple expedient of taking ordinary screen door springs—stretching them slightly in the vise, thus giving them a permanent stretch—and cutting to a length sufficient to loop over the offending rods or shafts.

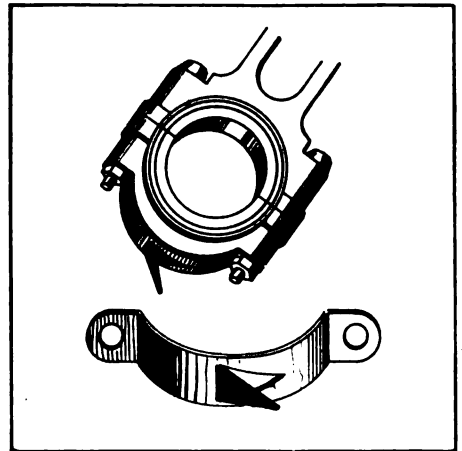
Fasten one end of the spring to one brake rod and then stretch the spring slightly and twist the other end of it around another brake rod—in other words, one spring between two rods. This puts a tension on the rods against the pins and bearings and no more rattles will be heard.—V. W. C., Ill.

\* \* \*

## Oil Splasher.

Cut a piece of heavy sheet metal to the size of the bearing caps on the connecting rods. Directly under the oil hole in the caps cut a slot the shape of a triangle about  $\frac{3}{4}$ ths of an inch long and bend down as shown in the accompanying illustration. The length of this slot will vary according to how close the connecting rods are to the crankcase pan when in the extreme down-stroke position.

If the motor has a very long stroke, and more splash is wanted, the slot may be cut to the shape of a rectangle. This oil splasher is placed on the caps and bent to fit and the holes drilled to match the ones

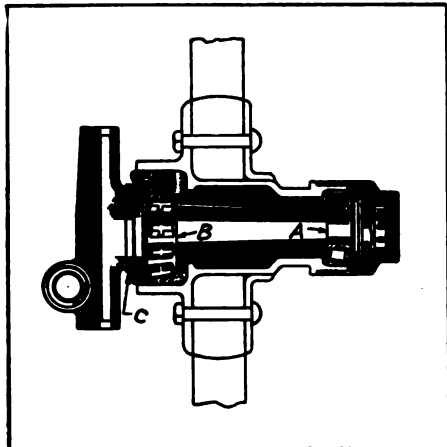


Method of Installing Oil Splasher.

in the bearing caps. This attachment is held in place by the bearing-cap nuts. It proves very effective on the 1916 Studebaker cars and many others not having good oil splashes.—H. C., Va.

### Taking Up Play in Bearings.

Certain forms of wheel bearings have only a limited adjustment range. That is, a combination of roller with taper shoulders, as shown in accompanying sketch.



How to Take Up Bearing Play.

Inner race A of outer bearing is held against the shoulder of the knuckle by the nut on the knuckle end. Inner race B of the inner bearing is held normally further on the knuckle by the thickness of the washer, C.

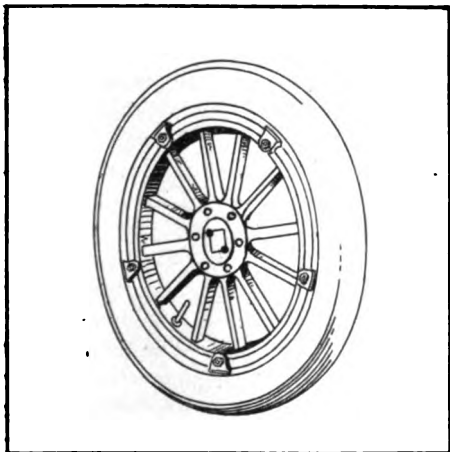
With wear on the tapers of rollers and races, the bearing surfaces often remain in good shape, but the wheels have an objectionable side play. Washer C represents the amount of side play which may be completely taken up by its use. It pays well to turn up this washer, considering the replacement price of new bearings.—V. C.

\* \* \*

### Rear Axle Kink.

We repaired a car with a semi-floating axle some time ago, but found that in starting the car or in driving over rough roads a sharp knock would be heard in the rear hubs.

Our first plan was to drive shims around



Repairing a Rear Axle.

the axle in the hub. The shims worked very well for a short time and then the same annoying noise occurred. We took the rear wheels off and found the shims pulverized.

We removed the axle and drew the temper from the end which fits in the hub. Then we replaced the axle, put the wheel on and turned it forward as far as possible.

The very next thing we did was to drill two holes half in the axle and half in the hub as shown in the accompanying illustration. We then re-tempered the axle and put it back in place and made it tight by driving two hardened pins of the correct size into these holes.—W. H. R., Ohio.

\* \* \*

### How to Test a Spark-Plug.

If the ignition points, wiring, distributor and timer are found to be operating perfectly, test the spark-plug by removing it from the cylinder head and connecting it up again with the wiring. Lay it on the engine in such a position that you can watch the spark. Place a business card between the points and turn the motor over slowly.

If the plug is working, a hole will be burned in the card when the time comes for it to fire. Spark-plug points should be spaced the thickness of a smooth dime.—F. O. C., Ill.

\* \* \*

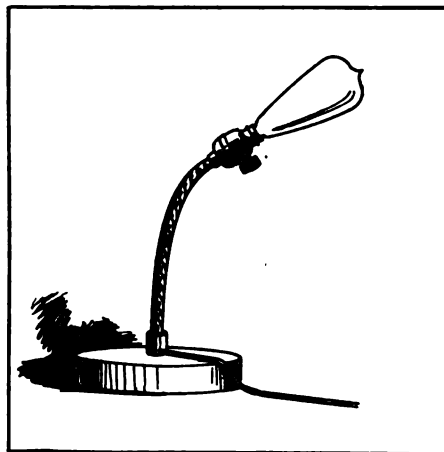
### A Handy Light.

To make a handy light to use under an automobile in doing repair work, take an old speedometer shaft and insert it in an old piece of iron as shown in the accompanying illustration. Draw the wire through the shaft and put a light socket on the other end. The light can then be used in any position. We have found it very useful when working under a car.—H. A., Wis.

\* \* \*

### Using Reamer in Lathe.

Recently we have found a very satisfactory way of using a reamer in the lathe. This method not only does more accurate

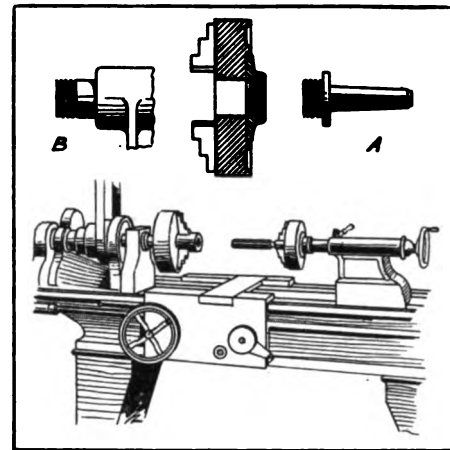


Light for Use Under Car.

work, but is a big time saver besides. We turned up a taper to fit the tail stock with a shoulder and a one-inch projection as shown in the accompanying illustration, and threaded it to receive a small four-

inch universal chuck for holding the reamer.

This special center with chuck is used in the tail stock of the lathe to hold reamers, drills, turning bars, or light cutting tools. We find the tools used in this way will



Method of Using Reamer in Lathe.

run absolutely straight and will not draw.

For rough heavy work we took out the tail-stock spindle and threaded it one inch from the front end to receive the chuck. In this way we can work one chuck in the tail stock and one on the head spindle, both at the same time.

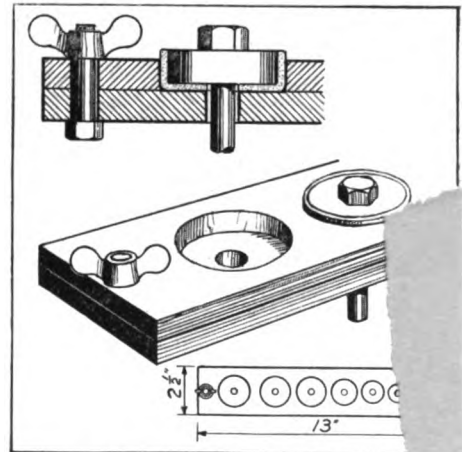
We find these special centers a wonderful help and time savers, especially when difficult jobs are to be done.—E. J. B.

\* \* \*

### Making Pump Leathers.

A machine as shown in the accompanying illustration for making most of the popular sizes of pump leathers used on regular tire pumps can be made as follows:

Take two brass plates 13 inches long and 2½ inches wide and drill one of them for the different size leathers to be formed. Drill the other plate with the same number of 5/16-inch holes. Fasten the two



Machine for Making Pump Leathers.

plates together with lock screws, shown in the accompanying illustration. Then make blocks ¼-inch smaller than holes in the top plate and use them shaping the leathers.—P. W. L., Pa.

# Accidents to Volunteer Helpers

You Can Always Find Plenty of Young Men Loafing Around a Garage—Some Are Willing Helpers—But Should They Become Injured, Is the Owner Liable?—An Informative Discussion of This Question of Liability

By Chesla C. Sherlock

It is not at all unusual for men, especially young men, and boys to form the habit of loafing at congenial places. Their interest may be centered in a desire for the companionship of their fellows, or it may be due to an interest in the work that is being done.

Loafing is not at all uncommon in garages; in fact, to boys and men mechanically inclined, a garage is the most congenial place on earth to spend their idle time. It was not unusual, then, that young William Morris should have formed the habit of loafing around the Sanderson garage after school hours and on Saturdays. William was about to finish his high school work and he was counting on a course at an automobile and tractor school that very summer.

He was willing and anxious to learn all that he could about the automobile repair business, just as most youngsters are, and he was not an unwilling meddler around the shop.

The Sanderson garage, as most of you already know, was a very congenial place for a youngster of William's bent. Old Man Sanderson himself was a kindly boss and he made no trouble for William; in fact, he scarcely knew that he was about.

It was not strange then that the boys in the shop should have commenced to give William little jobs to do, merely to help them out, and save them leg work. Sometimes he took the initiative himself and did things for them in their work, and again he did the work under their direction.

One Saturday morning, when William was hanging around the shop as a customer brought in a "flier" which was suffering from vibration or some other internal derangement. He wanted it fixed up so he visited a few stores.

One of the men, in attempting to make an examination of the coils, told William, who was standing by, to crank the car for him. The young man attempted to perform this service, but the flivver back-fired and he suffered a fractured arm.

Sanderson came in just as they had gotten William into a chair in the office. The first thing he did was to call the doctor, and then to ask for the details of the accident.

"What was he doing, anyway?"

"Cranking the car," was the response.

"Well, he shouldn't have been do-

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## Safety Always.

The matter of preventing accidents in connection with industrial work has come to be considered as a point vital to the success of any business. For reasons both economic and humanitarian, the industrial world is straining every effort to minimize the waste of human effort through accidents. In the factories, the principles of Safety First are enforced with compulsory strictness in an endeavor to achieve that one single problem of personal efficiency.

Gradually this trend of economic and humanitarian thought is seeping into the everyday life of the people, and whether it be in transportation, in the store, in the garage, or in driving a car, the slogan "Safety First" has been given widespread application. Lately, this slogan has been improved by coupling it with another, without which the first is really of little value, hence we now hear "Safety First—Safety Always."

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ing it," was Sanderson's comment. "I didn't hire him to work in the garage. If he came in here and jumped in and tried to crank that car, he was doing it on his own responsibility. I'm sorry, of course, that it happened. We'll have to stop this sort of thing and keep folks out of the garage unless they come here on business."

"But," protested William, weakly, through the pain he was suffering, "Joe asked me to crank the car."

Sanderson's brow puckered. "He did, eh? Well, I'll have to see about it."

As the state law required Sanderson to make a prompt report of all accidents, he promptly sent in a re-

port to the authorities, but he stated that William was not an employe and that he was puzzled as to what to do in the case. Likewise, for purposes of protection, he reported the matter to his insurance company.

After some correspondence back and forth, Sanderson finally received the following non-committal expression from the State Department:

"The question of your liability in the William Morris case would depend entirely upon the facts. If Joe Larson, who asked the young man to crank the car, had authority to engage help, or to represent you in such matters, it is probable that you would be bound. Or, if through your knowledge of his presence in the shop, through a long period doing such work, your acquiescence amounted to an establishment of the relation of employer and employed, you might be liable for the accident and injury.

"On the other hand, if William Morris was merely a meddler and a volunteer who offered to aid you in an emergency without thought or hope of compensation for such services, or if Joe Larson had no authority to engage help or act in a representative capacity, you would not be liable.

"The important requisite in a workman's compensation case is that there shall have been a contract of employment between the employer and the injured man. This contract may be oral, written, or based upon mutual assent implied from the acts of the parties. If such a contract existed, in implication of law only, even for the few minutes of the accident, then you must pay compensation.

"It does not seem that, technically speaking, such liability is imposed on you in this instance. The department feels, however, and suggests that the fair thing for you and your insurance carrier to do would be to compromise with this young man by paying his doctor bill."

The insurance company agreed to do this, in interests of harmony, and everybody was happy.





# Lubrication of Kerosene Tractors

Nothing Connected with the Operation of a Kerosene Tractor Is as Important as Correct Lubrication—This Subject Is Discussed in Detail Together with a Complete Explanation of the Oiling Systems and Their Appliances

By E. C. Pohlmann

Do you know what oil to recommend and what advice to give your customers concerning the lubrication of their tractors? Or would they find themselves in difficulties and, asking for bread, be provided with a stone or something equally indigestible?

Much has been written and much, much more has been said concerning the lubrication of automobiles, and now with the advent of the tractor more oil is being spilled in the interest of its proper lubrication.

The manufacturers of automobiles nearly all now agree, in their instructions to owners, as to how often a certain part on the car should be lubricated; what should be used, whether oil or grease; and how often lubricant containers should be cleaned and filled with entirely fresh oil, grease or compounds. Furthermore, these instructions—grease water-pump bearings every 100 miles, replenish grease in wheel hubs every 2,000 miles, etc.—are based on miles of operation. The reason for basing these instructions on miles of operation is because the automobile operates under different

loads and normally so many miles of travel represent a definite expenditure of power, part of which is the power required to overcome friction.

But in tractor operation, such instructions as "turn down every day" or "replenish every day" mean nothing, because the working day depends upon conditions. The tractor operates mostly on one load and that nearly full load; consequently, the power consumption, part of which is friction, depends on the hours of operations.

As to how often the oil in the motor should be renewed, manufacturers do not agree. Some say every 10 hours of operation; others, every 15 hours; and some, every week, which is the equivalent of about 40 hours of operation. Now most gasoline and kerosene engines are built very much alike, mechanically and in degree of workmanship, and generally operate under the

same conditions; consequently, such differences are more or less befuddling. The only advice that savors of common sense is "Use good oil."

What constitutes good oil is a much disputed question. At the present time, unfortunately, there is no instrument which will accurately indicate the true lubricating value of an oil or grease, and until such an instrument is devised, the

rubbing parts from direct metallic contact.

In the cylinders it has a secondary function—that of providing a seal between the cylinder walls and the piston to hold the charge in the combustion chamber during compression and explosion.

A motor burning gasoline is not as hard to lubricate as one using kerosene, because the higher boiling point of the latter makes it considerably more difficult to vaporize

and it has a greater tendency to liquefy in the cylinder. This condensed kerosene flows down the cylinder walls, washes off the lubricating oil and leaks past the rings into the crankcase containing the oil. The condensation of water used to keep the temperature of compression down so as to prevent pre-ignition, also washes down past the rings and further contaminates the oil.

These factors, together with the conditions under which the tractor operates—namely, under higher temperatures, dusty atmosphere and nearly full load—requires the selection of a lubricant which will give satisfactory results. This question of selecting a

proper tractor lubricant for your customer is not as hard to answer as it may at first appear.

The results of careful study and tests made by the manufacturers of lubricating oils furnish a source of professional advice of which every garageman should take advantage.

Select any of the well-known tractor oils now on the market and trust in the honesty of the manufacturers. Their charts of recommendation will further advise you in the selection of the proper oil for any tractor.

Do not listen to the salesman of a new oil who claims that his oil is identical in character with that which he desires to supplant. He may tell you that as regards viscosity, flash and fire point and other features his oil cannot be distinguished from the brand you have. This may be

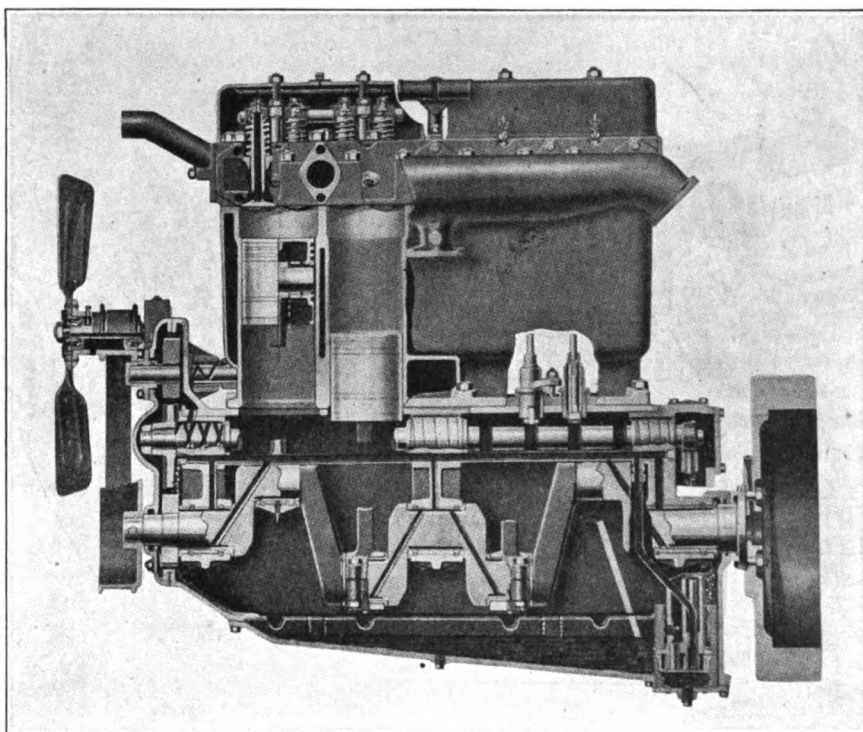


Fig. 1—A Typical Force-Feed and Splash System Found on Most Tractor Engines.

selection of a lubricant must be more or less a matter of guesswork.

It appears that all the garageman or repairman can do to insure uniformity of quality of the lubricating oil he sells, is to purchase some brand under a trade name, and trust to the honesty of the manufacturer that the name will always connote the same quality. This is unsatisfactory, to say the least, but matters cannot be improved until further investigations furnish specifications and methods of testing which will place the purchasing of oil on a more scientific footing.

The primary function of a lubricant is to make surfaces slippery so that they may slide over each other with the least amount of frictional resistance. Consequently, the lubricating quality of an oil is determined by its ability to maintain a continuous film over the lubricated surface, keeping the

true, but they fail in the one feature which is essential—the power to lubricate efficiently.

Generally speaking, the body of an oil for engine lubrication depends mainly on the cooling system, piston clearance, fuel used, oiling system, and outdoor temperature.

In an air-cooled engine, the temperature of the cylinder walls is very much higher than in an engine that is water-cooled. This necessitates the use of a rich, heavy-bodied oil, as heat reduces the viscosity of the lubricant.

The clearance between surfaces is of importance, because if the oil is too thin, it will run out, while if too thick, it will not flow freely between the surfaces, and, consequently, there will be dry spots and the metal will rub together.

If an oil too light in body is used, it works too freely past the piston rings and into the combustion chamber, causing smoking at exhaust and carbon deposit; besides it will not form a seal between the wall and the piston and will allow condensed kerosene and water to pass the rings and into the crankcase.

It is for this latter reason that the next grade heavier oil should be used when an engine is worn and has poor compression due to worn cylinder walls or pistons.

The fuel used is also a determining factor in the selection of an oil. Tractors which use gasoline entirely do not heat up as much as those using kerosene and consequently do not impose as severe service on the lubricating oil, and besides the condensation of kerosene tends to wash the kerosene from the cylinder walls. For these reasons, a kerosene-operating tractor requires an oil of heavier body than a gasoline-operating tractor.

Another important factor which should be considered in the selection of an oil is the method of lubrication. Bearings which are lubricated by a pressure oiling system may use a medium or heavy-bodied oil, as the pump pressure forces the oil to the entire bearing surface.

On the other hand, bearings which are lubricated by splash require an oil fluid

and lower temperature of the oil does not affect the body of the oil as much as the higher temperatures in the summer.

Keeping the foregoing factors in mind when recommending oil of the right grade

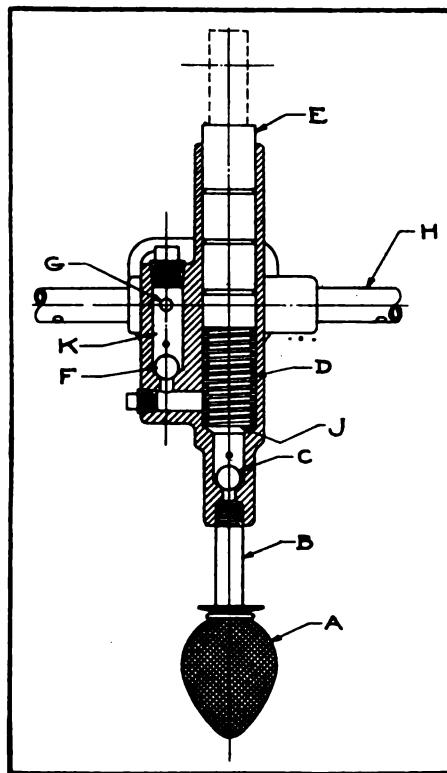


Fig. 2—Usual Type of Oil Pump.

and buying nothing but high-grade standard motor oils, will enable you to furnish your customers with lubricants which will prove correctly efficient.

Tractor engine lubricating systems can be grouped under four general heads according to the method by which the oil is distributed to the working parts:

In the force-feed system, oil is forced by pump pressure direct to the crankshaft bearings, and from there through drilled holes in the crank webs or pipes attached thereto to the crank pins. The piston pins, pistons, and cylinders are supplied by oil thrown from the crank pin bearings. The connecting rods do not dip in oil.

In the force feed and splash system, which is found on the great majority of tractor engines, oil is forced by pump pressure or centrifugal force of the revolving flywheel direct to the crankshaft bearings. The connecting rods dip into the trough in the crankcase and splash oil to all parts of the engine. A constant oil level is maintained in the troughs by an overflow to the reservoir from where the oil is circulated again. A typical force-feed and splash system, as found on most tractor engines, is shown in Fig. 1.

In the circulating splash system, oil is supplied from a reservoir by means of a pump or the centrifugal force of the revolving flywheel to wells over the crankshaft bearings or direct to the splash troughs. The connecting rods dip into the

troughs and splash the oil to all parts of the engine.

In the splash system, oil is supplied to the crankcase by a mechanical oiler or vacuum-controlled flow from an oil reservoir or tank. The connecting rods dip into and splash the oil to all parts of the engine. Adjustable oil feeds are used on mechanical oilers to control the supply which maintains the splash level, and sight feeds are employed to indicate operation of oil pump.

The usual type of oil pump used in force-feed lubricating systems is shown in Fig. 2. This pump is of the plunger type. The plunger is made of hardened steel and is ground to a close fit. A spring holds the upper end of the plunger, E, against an eccentric on the camshaft and, when the engine is running, the plunger works up and down in the sleeve of the pump bushing.

The check valves are both located in the pump bushing, the plunger being solid. The oil is forced out through a passage in the body of the pump through a check valve, F, and into the pipe, H, which leads to both ends of the engine. Many of the force-feed systems are equipped with mechanical lubricators.

One make of lubricator, the Madison-Kipp, is shown in Fig. 3. This type has multiple pumps with two pistons for each oil lead. The oil level is indicated by a glass gage on one corner. The method of regulating the amount of oil consists in revolving the adjustable screw over each pump.

In this way an adjustment from nothing to the total capacity of the fall stroke of the plunger can be obtained. These screws should be so adjusted that each cylinder gets eight to ten drops of oil and the bearings about three drops at each stroke of the plunger.

Another type of lubricator, the Detroit, is shown in Fig. 4. The upper piston, J, driven through the belt crank yoke, B, by the eccentric, D, lifts the oil from the

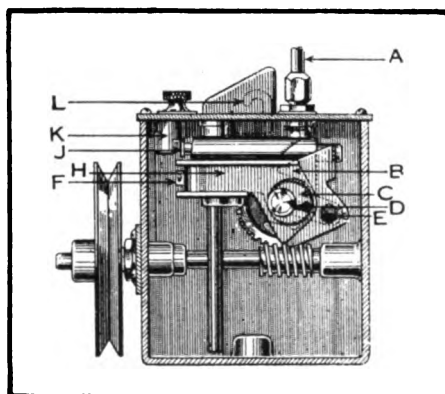


Fig. 4—The Detroit Lubricator.

reservoir and discharges it from the nozzle, L.

The amount of oil discharged is regulated by the adjusting button on cover, (Concluded on page 50)

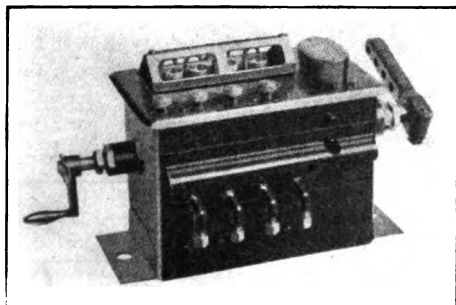


Fig. 3—The Madison-Kipp Lubricator.

enough to be thoroughly distributed and carried into the bearing surfaces and, for this reason, a medium oil is preferred.

In the winter time a grade lighter oil should be used, since the more uniform

# Making Stock for Small Bearings

Almost Every Day You Are Called on to Replace Bearings—Sometimes It Takes Quite a While Before You Can Get the Desired One from the Factory—Be Prepared by Making Stock During Spare Time—Read How

By J. N. Bagley

Nearly every day in the year you are called on to replace a brass or bronze bearing for some part of a machine. To carry in stock all the necessary sizes of bronze-bearing metal would involve quite a little capital; besides many times a bearing made of a lower grade of metal will answer the purpose at a lower cost. For instance, a spindle bushing can be made from stock that would not be at all satisfactory for the high-speed shaft of a cream separator. Therefore, the lower grade of bearing metal can be used to advantage, providing the repairman uses good judgment in determining the quality of metal needed for the bearing.

Of course, this home-made bearing metal is not supposed to be as good as the special non-grain on the market, but it is a good metal for ordinary work, such as lawn-mowers, threshing machines, and machines of a similar nature. For automobile bearings, such as spring toggles, steering knuckles, etc., it will answer very well. Such parts as the wrist-pin bushing and other parts operating under high speed and strain, should be made of the very best bearing bronze.

One should always save the old bronze taken from machinery and not sell it to junk peddlers, as the price obtained for it is not equal to the value of a single repair job one can get by melting it and using it in repairing an old bearing.

This old metal can also be melted and molded into round stock which can be made into almost any shape desired with the aid

of an inexpensive mold and an ordinary forge fire. The fire should be made deep and well lighted, after which the crucible should be heated slowly until the metal begins to melt to a point when piece by

when the metal is ready to pour it should be done at once, instead of looking about for something with which to handle the crucible. The metal should be poured at once and not in a stringy stream, for it

will cool sufficiently to stop flowing before it has been poured out over the entire mold. The gate above the mold should be large enough to force the metal into all parts of the mold. Next in importance is to know the stock size required to make the finished bearing.

With a couple of pieces of white pine fastened together with dowel pins, as shown at C, in Fig. 1, we can proceed to make the pattern. The blocks A and B, should be sufficiently longer than the stock is wanted to allow for an impression in the mold to carry the core. It is better to core the stock, because it takes a little less time to machine it.

The dowel pins should not extend entirely through the second piece of wood, B, but should be arranged so that in case the top half of the pattern be lifted off it can be replaced with the ends the same as before. The pins should be made fast in half A, and slightly looser in B, so that when part A is removed, the pins will remain in it. Now by placing the entire piece in the lathe, and supporting the outer end by the tail-stock centers, as D, we are ready to turn it to the required size.

In Fig. 2, we have the finished pattern, so far as the turning is concerned. The parts A and B are held still by the pins C. The projection at each end, D, is left the size we want the hole cored through the stock. This can be arranged to meet the requirements while making the patterns. Now that we have the pattern turned,

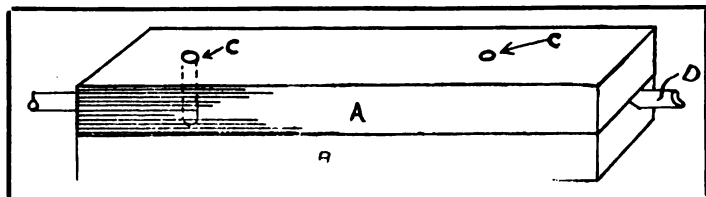


Fig. 1—Blocks of Wood From Which Pattern is Turned.

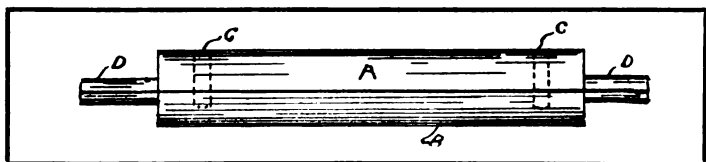


Fig. 2—Pattern Turned From Blocks of Wood Shown in Fig. 1.

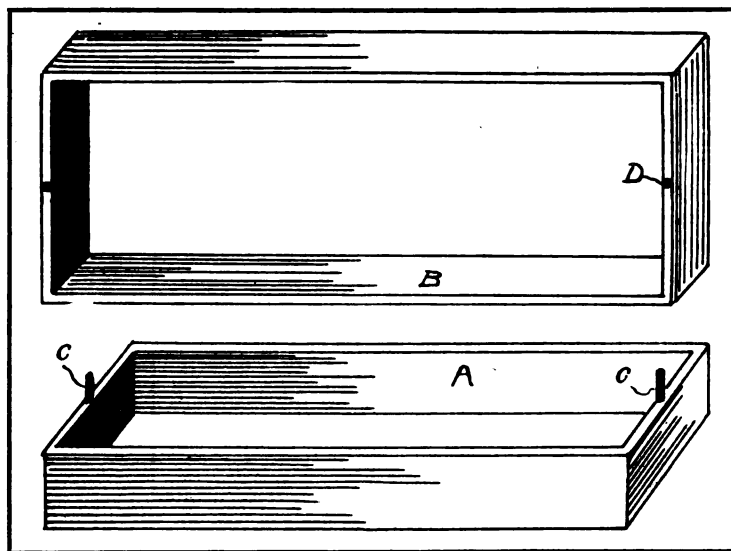


Fig. 3—The Upper and Lower Half of Molding Box.

piece may be added until the desired amount is melted.

There are a number of different kinds of crucibles on the market. Some are of black lead, others of graphite, and some of sand. They are not expensive and one can have a half-dozen different sizes and use only the size that would come nearest to answering the requirements. When buying the crucible, it is a good plan to get a lid for each, for by covering, much heat is held in which would otherwise be lost at the top, especially if the crucible is a trifle large.

Next in order, will be a pair of tongs to fit each of the crucibles, for it is awkward to try to handle the crucible without tongs to fit the one being used; besides,

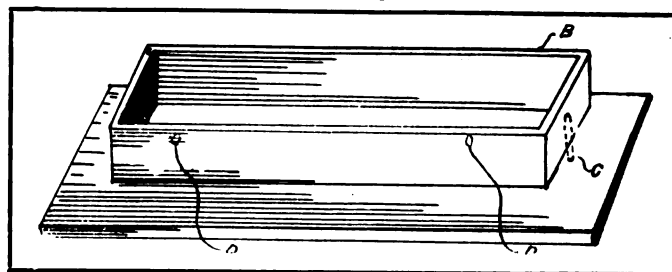


Fig. 4—Preparing the Lower Half of Mold.



will give it a coat of hot beeswax, so that the metal will not stick to it when the mold is being made. Patterns are best handled if not too long, anywhere from six to 10 inches works very well. In case the bar

of, especially if it be plaster of paris, otherwise constant use will cause the material to slip out of the frame, and when it does not have protection of some kind at the corners, it will chip away very easily.

We are now ready to make the mold. In the

used to prevent the parts from sticking together. I have found that powdered graphite does very well and can be found in almost every shop.

Sprinkle, or rather dust it over the surface of the already finished part. To obtain an even distribution of the graphite, take a piece of cloth about 12 inches

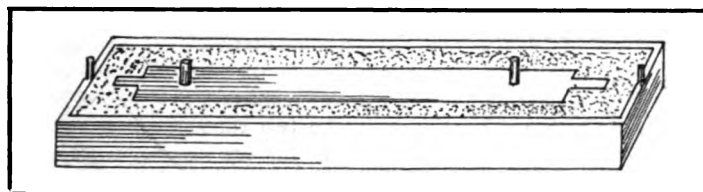


Fig. 5—The Lower Half of the Pattern in the Mold.

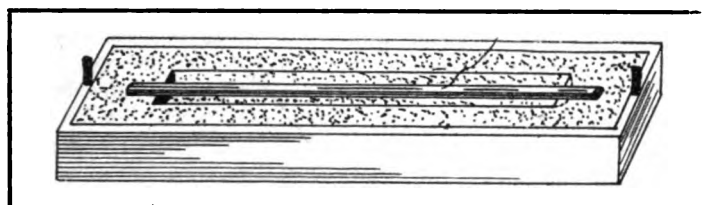


Fig. 6—Placing the Core, "A," in Position.

cast is quite large, it makes quite a little metal to melt in a forge, although if a well-banked fire is made you will experience no trouble.

In making the core or the pattern for the core, it should be at each end exactly the same as the ends of the pattern so that in supporting it in the mold, it will fit exactly where the pattern comes out. In case the core is a little larger in the pattern, the core could be made larger except the end, *D*. This would save a little time in making an extra pattern for a piece of bearing stock with a larger hole and yet, at the same time, have the outside diameter.

Next in order, will be a box for a flask. This can be made of thin lumber and should be roomy, especially if sand or plaster of paris is to be used for molding. I would recommend the latter as many casts can be made without destroying the mold unless some accident befall it. The writer has made as high as 50 castings of a single piece and yet even the last were very good. In this case two separate boxes with neither top nor bottom, as shown at *A* and *B* in Fig. 3, will be required. Into each end of the "drag" or bottom half, place pins *C*, to allow the cope or top to be replaced in the same relation each time.

These parts should be well fastened at

first place, it will be necessary to obtain a board, *A*, Fig. 4, on which to lay the lower half of the patterns while making the lower half of the mold. Now make small holes, *D*, in the board for the pins in the pattern to set in, while making the mold. Then when placing the half of the flask over the pattern on the board, we find there are a couple of pins in it that hold it up. It is also necessary to have holes *C*, in the board for the pins, to allow the lower half of the flask to rest flat. Now we have the pattern securely fastened on the board, *A*, and the lower half of the flask, *B*, resting squarely on the board.

Mix up a quantity of plaster of paris which will fill the space and is thick enough to be pushed well into shape. It should not be thin and watery but should have plenty of body. Fill the box, being careful to force it well into all cracks and corners and around the pattern. This will complete all that can be done until it sets and dries, except stroking of the surface, which should be done as soon as finished. At this time it would be well to take a nail and mark on the top the size of the casting and such other information as will be useful later on.

After leaving it in this manner for a day, if possible, turn it over and remove the board from the pegs, and we have the

square, form it into a bag by bringing the ends together, fill it half full of graphite and tie the ends. After this a second batch of mortar can be mixed and the flask filled. Set away to dry and harden. It should be thoroughly dry before attempting to make a casting.

As soon as it is dry, a gate with a sort of a funnel entrance should be made about in the center of the top half of the flask. It is a good plan to drill a few very fine holes in the top part of the mold to allow the air and gases to pass out as the molten metal is poured in. The object of having the funnel-shaped entrance for the metal is to allow the metal to be dumped rather than poured and to give weight to force the metal well into all the little crevices of the mold.

We will now suppose the mold is dry and in readiness for the first cast. The next thing in order will be to place the core in position as shown at *A*, Fig. 6. As soon as the core is in place, we are ready to place the top of the flask in position and clamp down or lay a heavy weight at each end to prevent raising or allowing the metal to crawl out around the edges.

When the cast is made and cooled, the "cope" may be removed carefully and the cast stock lifted from the "drag" or bottom half. Now remove the core with a chisel

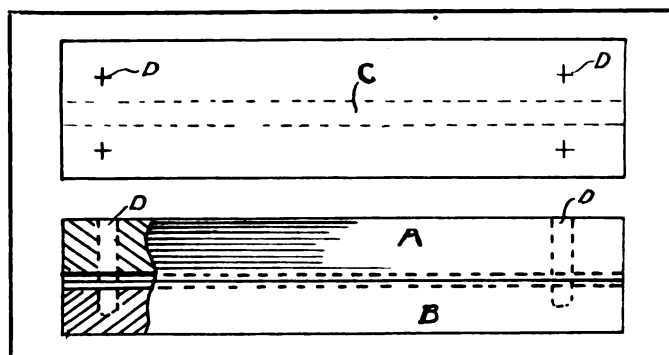


Fig. 8—A Home-Made Core Box.

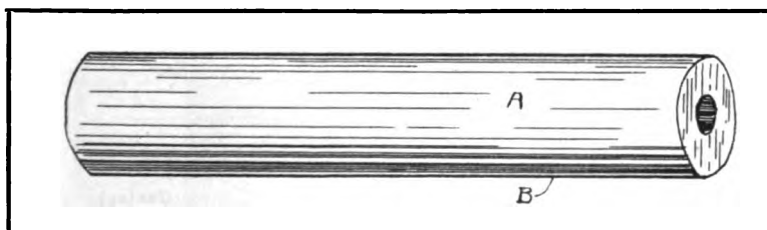


Fig. 7—The Finished Casting After Removal From Mold.

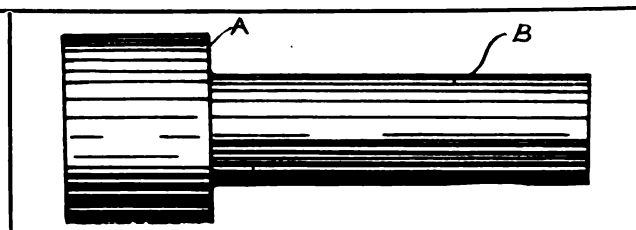


Fig. 9—Pattern With Removable Flange in Place.

the corners to prevent them breaking when handled. It is not a bad idea to place a few screws from the outside of the cope and drag, allowing them to stick through to hold the material that the mold is made

flask as shown in Fig. 5. The lower half of the pattern is in the "cope." Over this place the remaining half of the pattern and we are ready for the other half of the mold, except that some powder should be

or by punching it to pieces with some instrument, and the stock is ready to use.

These cores can be made of the same material as the mold, or they can be bought (Concluded on page 42.)

# Readers' Questions and Answers

Conducted by E. C. Pohlmann

## Timing Chevrolet.

Will you kindly tell me how to time a Chevrolet, 4-90, 1917 model car?—F. E. S., Md.

If the engine has been taken apart and the timing gears have been removed, insert starting crank and turn over the engine until the piston in cylinder No. 1 is at its uppermost position or top dead center. Then rotate the camshaft so that the push rod operating No. 1 intake valve lightly touches the rocker arm.

The opposite end of the rocker arm should be against the valve stem. Then install the camshaft gear and secure it properly. Adjust the clearance between the push rod and rocker arm so that it is 0.005 inch or the thickness of an ordinary sheet of writing paper.

If you have been accurate in getting the piston on upper dead center and in setting the camshaft, the star on crankshaft gear should match with the star on the camshaft gear. If they do not match, you will have to repeat the operation.

As the cams are integral, the opening and closing of the valves on the cylinders 2, 3 and 4 will come at the proper time so that it is only necessary, after having secured the settings for No. 1 cylinder, to adjust the push rods for proper clearance.

In Fig. 1 you will find a valve-timing diagram from which the relative positions of the valves can be seen.

The intake valve begins to open when

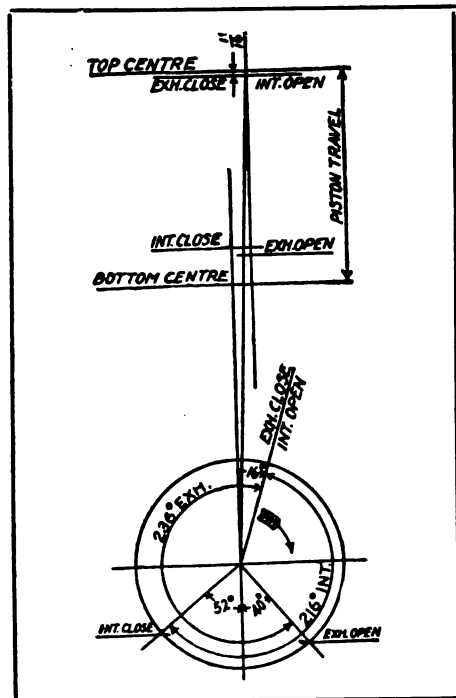


Fig. 1—Valve Timing Diagram.

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

the piston has traveled 1-16 inch below top center.

The motor cylinders are numbered from the front of the car. Cylinder No. 1 is the nearest to the radiator, No. 2 next, etc. Cylinder No. 1 fires first, No. 2 next, then No. 4, and finally No. 3.

To check the ignition retard spark, insert crank, and turn engine until the intake valve on No. 1 cylinder begins to open, continue to turn the engine over until the piston has traveled downward and again returned to its uppermost position or top dead center of compression stroke.

Remove distributor head and examine position of the two contact points. If these are just beginning to open, the ignition timing is correct. If they are not in this position, remove the locknut holding

the igniter cam to the shaft and pry the cam loose from the shaft. (See Fig. 2.) Then turn the cam in a "clockwise" direction until the two contact points begin to open; that is, the two contact surfaces no longer touch each other.

The locknut can then be slipped on the shaft and securely tightened against the cam; however, in doing this, use care not to disturb the position of the cam. This distributor arm and cap can now be put in place and the car operated.

The order of firing is 1-2-4-3 and the No. 1 wire is the one above the small slot on the edge of the distributor case. This slot fits over the locating pin on the rim of the distributor shaft body. The rotation of this shaft is called "clockwise," that is, it turns in the same direction as the hands of a clock.

\* \* \*

## Steam Tractors.

Is there a tractor made in the United States that gets its power from a steam engine such as is used on steam cars? If so, please give the names and addresses of firms manufacturing such tractors.—S. N. F., Ida.

The following are manufacturers of steam tractors:

Acme Road Mchry. Co., Frankfort, N. Y.

A. D. Baker Co., Swanton, Ohio.

Bates Machine Co., Joliet, Ill.

Buffalo-Pitts Co., Buffalo, N. Y.

J. I. Case Threshing Machine Co., Racine, Wis.

Nichols & Shepherd Co., Battle Creek, Mich.

Phoenix Mfg. Co., Eau Claire, Wis.

Some of these firms manufacture steam tractors for road work exclusively while a few of them have given up the manufacture of steam tractors for the kerosene tractor. We do not know whether or not

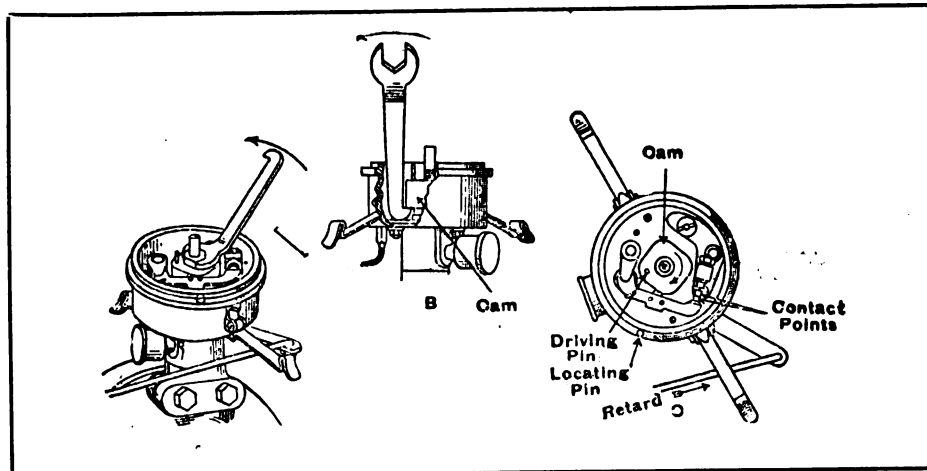
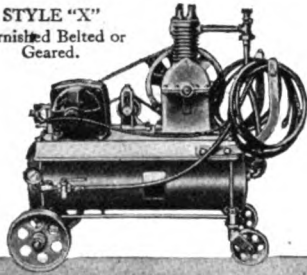
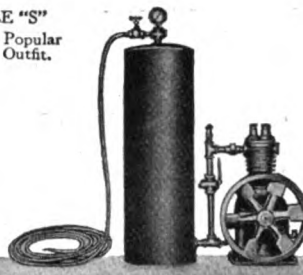


Fig. 2—Method of Timing the Ignition on Chevrolet.

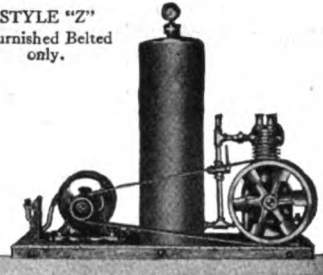
STYLE "X"  
Furnished Belted or  
Geared.



STYLE "S"  
Simple, Popular  
Belted Outfit.



STYLE "Z"  
Furnished Belted  
only.



The Curtis Sign is 10 x 14 inches—baked enamel on steel. It is furnished FREE with every Curtis Garage Air Compressor and cannot be obtained in any other way.



## Conserve Your Patrons' Tires

Motorists will go a long ways to find the Curtis Sign and get Curtis Air—FREE FROM OIL—because it means less blowouts and greater tire mileage.

# CURTIS Air

## ~ Free From Oil

Because of correct design and good construction, Curtis Garage Air Compressors are dependable and operate with minimum power. The patented and exclusive self-regulating splash oiling system prevents oil from getting into the air line. The air is pure, clean, safe and FREE FROM OIL.

### OTHER CURTIS FEATURES

Fan flywheel cools cylinder. Valves of light weight and large area. Hand unloader permits starting against full tank pressure without injury. Large drop-forged crank shaft. Adjustable, renewable, die-cast, non-cutting bearings. Head removable without breaking pipe connections—only one gasket.

### MADE IN VARIOUS SIZES

Curtis Compressors are made in various styles and sizes to suit your special needs. Write today for illustrated literature giving full particulars. Use the coupon.

### CURTIS PNEUMATIC MACHINERY CO.

1515 Kienlen Ave.,  
St. Louis, U. S. A.

Branch Office:  
530-U Hudson Terminal,  
New York City.

Curtis  
Pneumatic  
Machinery Co.  
1515 Kienlen Ave.  
St. Louis, Mo.

Gentlemen:  
Please send me full details  
on Curtis Air Compressors—  
your proposition and prices.

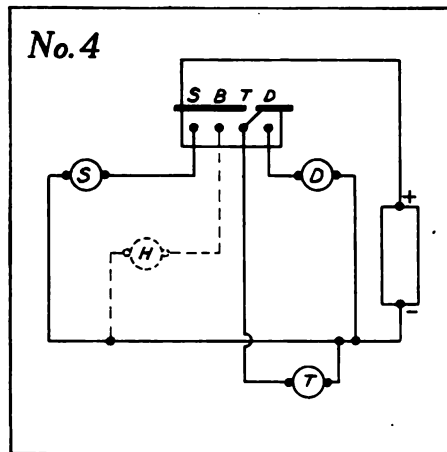
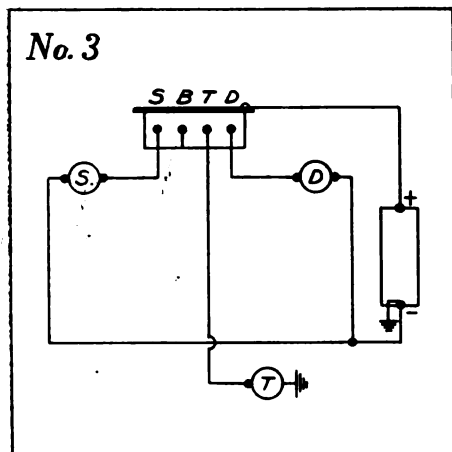
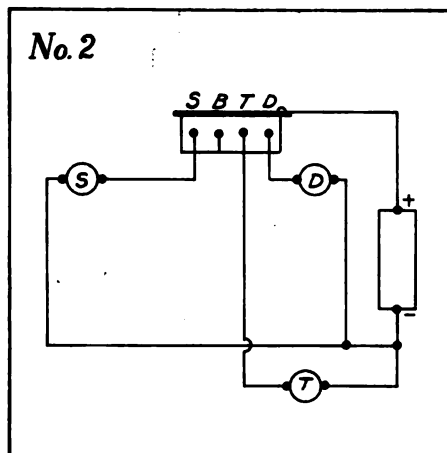
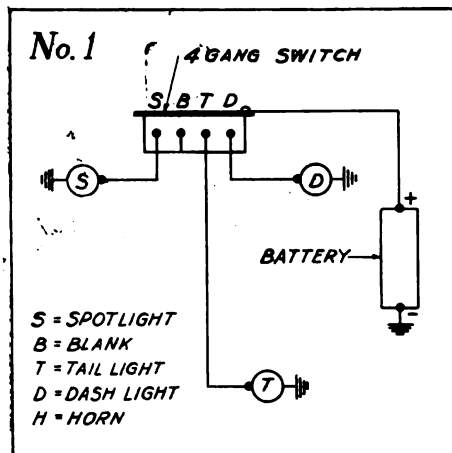
Firm Name.....

Address.....

Jobber's Name.....

Address.....

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



Four Different Diagrams for Wiring Electric Lights on Car.

any of these firms manufacture steam tractors for farm purposes.

\*\*\*

### Wiring Diagram.

I have a Marmon touring car which I am in doubt about as to the year it was built. The plate attached to the car gives the following information: Model 32; Engine No. 23397; 4 cylinders; bore  $4\frac{1}{2}$ ; H. P. 32. What I want to know is where I can

get a wiring diagram for this model; also if it is possible to get any instruction book covering this car from the Nordyke-Marmon Co.

Do you know whether there is anyone who makes patterns from which a person can build any style of body himself?—A. G. L., Calif.

The car referred to is a 1913 model.

The wiring diagram you ask for will be

found on one of the pages of this department.

Yes, we think you can obtain a copy of the instruction book by writing to the Nordyke-Marmon Co., Indianapolis, Ind.

To our knowledge there is no concern making patterns which you can purchase and use for building the body yourself.

\*\*\*

### Wiring Car.

Kindly give the best diagram to wire a car, as per sketch. Give ground system and others. Prefer method with least wiring, but would appreciate other wiring diagrams also.—F. B., Ill.

On one of the pages in this department you will find four different wiring diagrams. Many combinations are possible, but the simplest and least confusing are those which we are publishing.

No. 1 is a diagram with the least amount of wiring. Perhaps the best to use from almost any standpoint is No. 2. It is easy to trace connections in this one and it should give the least trouble.

In No. 4 you will find some departures. One of the upper contacts is electrically disconnected from the common bus. Then the lower contact of the tail-light switch is connected with this isolated upper contact so that the dash light cannot be lighted unless the tail light is on.

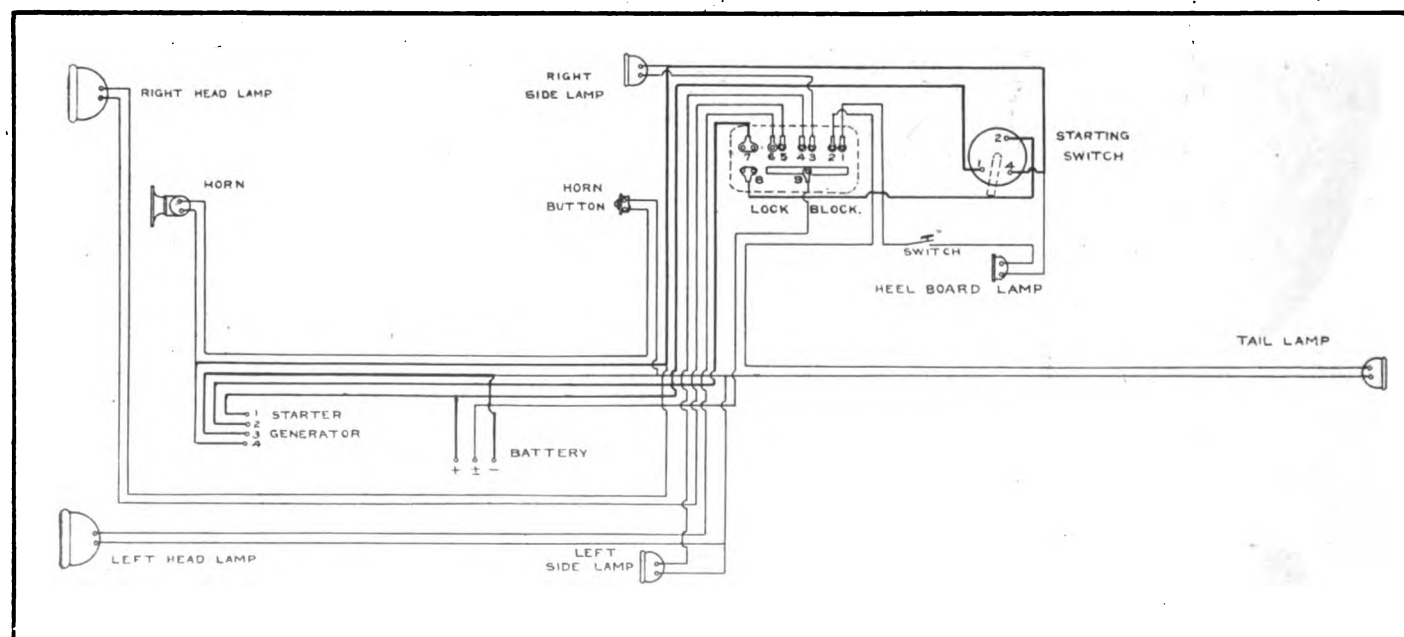
This diagram is only a refinement of No. 2. The purpose of operating the dash-light through the tail light switch is merely to check the tail light. The blank switch may be used to control an electric horn if desired.

\*\*\*

### Dry Cells.

Please send me the formula for charging dry cells, also the proper amount for each dry cell. Your magazine is fine.—F. G., Mont.

The elements contained in a dry cell are



The Wiring Diagram of the 1913 Model 32 Marmon



# It's Springtime!



**. . . and profit-time as well!**

Roads are bad—springs are breaking. Sell spring-service and satisfaction, incorporated in VULCAN—the Replacement Spring. Your profits will grow with the service you render.

If your jobber cannot supply you, write us today.

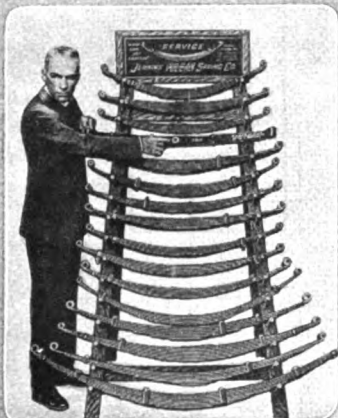
**Jenkins VULCAN Spring Co.**

Factory, Richmond, Indiana

**Branches:**

Atlanta, Ga.	Boston, Mass.	Dallas, Tex.
Kansas City, Mo.	Reading, Pa.	Minneapolis, Minn.
	Richmond, Va.	

*The VULCAN Spring Rack is sent free with your first order for VULCAN Springs.*



**When Springs Break, put on VULCAN**  
The Replacement Spring

usually combined in such proportions that by the time the electrolyte is exhausted the zinc will be used up and of no further use. It is much cheaper to replace the old cells than to try to repair or, as you say, charge

### Horsepower Table.

In using table, find bore of cylinder in inches or millimeters in the proper left-hand column, then read across to right, under column for the number of cylinders for the engine under consideration has.

Bore = D		No. of Cylinders = N			
Inches.	Milli.	4	6	8	12
2 1/4	64	10.00	15.00	20.00	30.00
2 1/2	68	11.03	16.54	22.05	33.08
2 3/4	70	12.10	18.15	24.20	36.30
2 7/8	73	13.23	19.84	26.45	39.08
3	76	14.40	21.60	28.80	43.20
3 1/8	79	15.63	23.44	31.25	46.88
3 1/4	83	16.90	25.35	33.80	50.70
3 3/8	85	18.23	27.34	36.45	54.68
3 1/2	89	19.50	29.40	39.20	58.80
3 5/8	92	21.03	31.54	42.05	63.08
3 3/4	95	22.50	33.75	45.00	67.50
3 7/8	99	24.03	36.04	48.05	72.08
4	102	25.60	38.40	51.20	76.80
4 1/8	105	27.23	40.84	54.45	81.68
4 1/4	108	28.90	43.35	57.90	86.70
4 1/2	111	30.63	45.94	61.25	91.88
4 3/4	114	32.40	48.60	64.84	97.20
4 7/8	118	34.23	51.34	68.45	102.68
5	121	36.10	54.15	72.20	108.30
5 1/8	124	38.03	57.04	76.05	114.08
5 1/4	127	40.00	60.00	80.00	120.00
5 1/2	130	42.03	63.04	84.05	126.08
5 3/4	133	44.10	66.15	88.20	132.30
5 7/8	137	46.23	69.34	92.45	138.68
6	140	48.40	72.60	96.80	145.20
6 1/8	143	50.63	75.94	101.25	151.88
6 1/4	146	52.90	79.35	105.80	158.70
6 1/2	149	55.23	82.84	110.45	165.68
6 3/4	152	57.60	86.40	115.20	172.80

the old ones. If you want to try rejuvenating dry cells, punch a series of holes through the top of the cell and soak them in a saturated solution of sal ammoniac for a day or more. Then remove and seal these holes with pitch or sealing wax. We want to thank you for your words of appreciation.

\* \* \*

### Horsepower Table.

Please publish in your next issue the table giving the horsepower rating of 4, 6, 8 and 12-cylinder engines for different bores. At what speed does the rear wheel turn when the Maxwell motor turns at 1,200 r. p. m.? Please explain how this is calculated.—A. S., Mich.

The table you ask for will be found on one of the pages of this department.

The wheel speed is approximately 343 r. p. m. This is found by simply dividing the revolution per minute of the engine by the gear ratio. The Maxwell gear ratio in high is approximately 3.5. Dividing 1,200 by 3.5 gives 342.8.

\* \* \*

### Charging Batteries.

Will you kindly give me some information in regard to the switchboard which I have? This switchboard is the one that the Acorn Electric Co. uses with its lighting plant. It is equipped with an ammeter, voltmeter, and National rheostat. The switchboard is rated at 32 volts.

What I want to know is: Can this switchboard be used for charging one or more storage batteries? I have a 3/4-kw. Delco light plant which is rated at 32 volts and which I have connected with the switchboard.

I connect a six-volt storage battery to

the switchboard and the voltmeter indicates six volts. With switch No. 2 open, voltmeter reads 32 volts. Now what I don't understand is why voltmeter should read 32 volts when line is open and only six volts when it is closed through the battery. Ammeter reads 2 to 4 points until I turn rheostat to more charge and, of course, the charge rate increases, but not the voltage. Why is that? I am sending a diagram of the way I have the switchboard wired.—R. L., N. D.

From the information you have sent us, this switchboard can be used to charge as many batteries as the voltage available for charging permits, and is sufficient to overcome the counter electromotive force and internal resistances of the batteries on charge.

Since the process of charging a battery is the reverse of discharge, voltage must be supplied to neutralize the rated voltage of the battery and then enough voltage must be available for overcoming the internal resistance of the battery to drive the charging current through. Hence with 32 volts at your disposal, you should have little difficulty in charging four six-volt batteries on one charge.

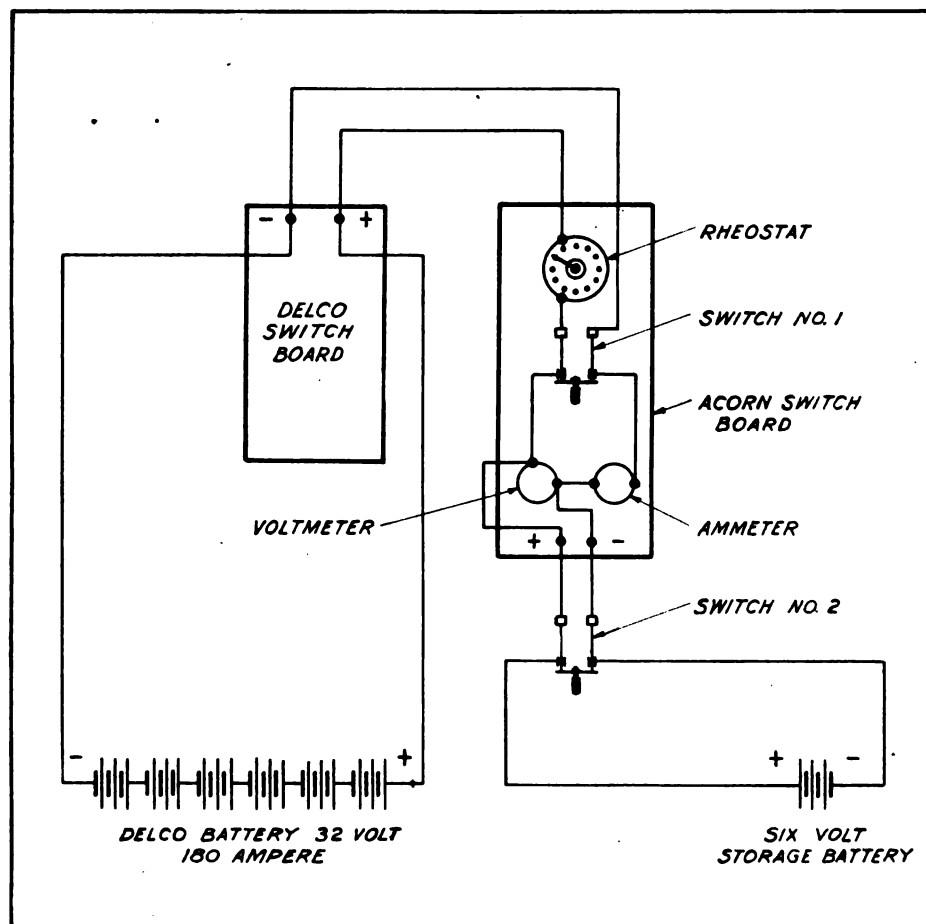
In any direct current circuit the voltage drop over any part of the circuit is equal to the product of the current flowing and the resistance of the part of the circuit considered. Now when switch No. 2, as shown in the accompanying sketch, is open, the current flowing is zero, except for the cur-

rent required to actuate the voltmeter. But this current is so small that the product ( $E=I.R.$ ) of this current and the resistance of the regulating rheostat, which is necessarily small, is so low that you cannot detect any voltage drop in your voltmeter readings. It results fundamentally in reading the voltage of your Delco battery, that is, 32 volts.

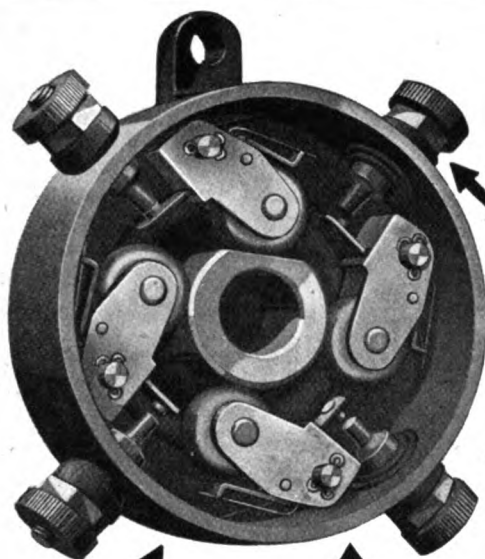
If this switch is now closed and the current from the Delco plant, several amperes, flows, the voltage drop in the regulating rheostat becomes appreciable and the voltmeter reads only the voltage effective in sending the charging current through the battery on charge.

From the information sent us, we cannot answer definitely why the voltmeter reading does not change when you increase the charging rate. It should be noted here that the specific gravity of a cell on charge increases as the charging process progresses, hence the internal resistance of the cell decreases, also that the electromotive force of the cell rises slightly on charge.

Assuming that you have placed the battery on charge at a certain charging rate and the resistance of the regulating rheostat is reduced, a heavier current flows, increasing the charging rate. For reason noted in one of the preceding paragraphs, the resistance is decreased and the current increased, but the voltage drop may be constant for the instance you give and the voltmeter reading remains the same.



Wiring Diagram Which Shows How Reader Uses Lighting Plant for Charging Batteries.



# DUNTLEY

## MAGNETO BREAK TIMER

*Everlastingly Guaranteed  
to Always Make Good*

### INSULATED TERMINALS

Perfectly insulated terminals with knurled nuts. Quickly set with the hand.

### SELF CLEANING

Wipe contact, an exclusive feature, insures clean points at all times.

### NO WHIRLING CONTACTS

No whirling contacts grinding away over a metal segment. Contact made by means of rollers riding on steel cam.

### FIBER ROLLERS

Equipped with special composition fiber rollers that are practically wear proof.

### GENUINE TUNGSTEN POINTS

Equipped with genuine tungsten points that will not corrode pit nor burn out.

**AN UNBEATABLE COMBINATION**

# DUNTLEY

## WIRE and TERMINAL GUARD

### Overcomes all exterior ignition troubles

Altho the timer operates at a maximum of efficiency, broken and leaky wires, loose connections and short circuits utterly destroys the efficiency of the ignition system.

They are enemies to overcome.

The Duntley wire and terminal guard entirely eliminates the trouble makers, for it affords absolute protection to the most vital part of the ignition wiring system.

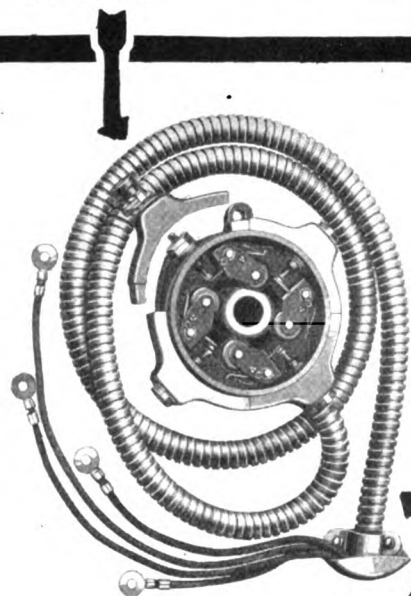
By its use the wires from the coil box to the timer are encased in a flexible metal conduit and the timer is protected by metal armor.

DEALERS— Our proposition will interest you.

**J.W.Duntley, 1011 Michigan Ave Chicago**

### REMOVABLE METAL GUARD

Timer guard removable in section for access to terminals and wires.



### FLEXIBLE METAL CONDUIT

Protects the wires from the coil box to the timer.

The combination of circumstances in the case you state may have been such as produce the results mentioned. Ordinarily, a variation in the rheostat should produce a change in voltmeter reading.

\* \* \*

### Otto and Diesel Engines.

I read with interest your explanation of the Otto and Diesel cycles which appeared last month in the Readers' Questions and Answers department, and as a result got into an argument with one of my workmen concerning the Otto and Diesel engines. I claimed that the Diesel engine could not be used in an automobile because the high compression requires heavy cylinders and that the engine would be too heavy for the horsepower it would deliver. He claimed that the increased efficiency, simplicity, and the use of cheaper fuel more than offset the disadvantage of weight. I think he's wrong, because if that were the case, why aren't they using Diesel engines in automobiles? Please decide.—J. B., N. Y.

The reason the Diesel engine is not used in an automobile is not because the high compression would require heavy cylinders, but because no relatively small pump has been developed that would deliver air at about 1,000 lbs. per sq. in., and be easy to operate, notwithstanding its many valves and regulating devices.

The explosion pressure in an Otto en-

gine ranges from 300 to 400 lbs. per sq. in. This is only 100 lbs. less than that employed in Diesel engine operation and would require little if any increase in the weight of the cylinder.

While the method of injecting the fuel is the serious obstacle, the conditions of combustion are also limiting factors.

The combustion of heavy oils is not so rapid as that of the more refined oils, and consequently at high speeds there is not sufficient time for the complete combustion of the fuel, and difficulties arise from sticky valves, smoky exhaust, dirty cylinders, etc.

Furthermore, the Diesel engine ignition depends upon the temperature of air at the end of compression and consequently if the speed of the engine is reduced very much, it may happen that the cooling effect on the slowly-compressed air would be enough to prevent the compression raising the air temperature sufficiently for ignition.

Again, at high speeds, due to the heavy viscosity of heavy oils, the amount of charge drawn into the cylinder would be so small that it is questionable whether it would be accomplished or not.

Hence, if the Diesel engine were used in place of the Otto engine in automobile practice, the speed would have to be low, and this would mean larger cylinders, and

larger cylinders would mean more weight. In that respect you are right that heavy cylinders are required, but not because of high compression.

The Diesel engine as used in marine or stationary practice is out of the question for automobile use. On the other hand, if no reliable high-pressure pump can be developed, which at the same time can be easy to operate, and the difficulties of combustion limit the use of fuel to refined oils such as gasoline, naphtha, kerosene, etc., the great advantages of the Diesel engine—simplicity and the use of cheap fuel—at once disappear.

You are right if you mean that the Diesel engine as employed in present practice cannot be used efficiently and economically in an automobile. But remember that the Diesel cycle is another thing and can be used in automobile practice and is being used in experimental work, although the engine is not sufficiently developed to be adapted for production.

In Germany the Diesel cycle is being employed with good success in airplane engines and time will certainly develop a Diesel engine which will give good results in an automobile chassis, unless the Otto engine is concurrently developed to such an extent that a Diesel engine will add nothing to the efficiency, economy, and simplicity of an automobile.

# Readers' Questions on Accounting

## Simplicity in Accounting.

We would like to have some information regarding the accounting system which is appearing in the AMERICAN GARAGE & AUTO DEALER.

We now have a system for which we paid \$75, but which has not, up to the present time, been put into complete operation. It is a good system, but it seems over-elaborate in some respects, necessitating a good deal of detail work.

It is designed to record costs with selling prices, making it possible to get fairly exact information concerning the business at the end of each month without taking inventory. If it is possible to simplify our system and cut down the clerical work, we might be interested.—N. B. T., Colo.

If you will procure copies of the AMERICAN GARAGE & AUTO DEALER, beginning with June, 1919, issue, and read or re-read the articles on garage accounting, you will readily understand that simplicity is the big item we have been trying to feature in this system. For \$75 one ought to get a pretty complete system. It is quite possible, however, that it is much too elaborate for your business.

We are sending you under separate cover the principle garage forms which we have stocked. Most of these have been outlined in the AMERICAN GARAGE & AUTO DEALER. The others will be outlined later. We recommend the use of a duplicating statement ledger for customers' accounts. Of

course, if you do a strictly cash business, you will not have any accounts receivable.

We can send on receipt of order, forms assembled in binders and ready to start working on. Our terms are cash with order or C. O. D. express, but you may return any part or all of your order if for any reason you wish to do so. On return of merchandise, we will send you money order for amount due you.

It may be that your present system could, with slight alterations, be made to give you service. Or it may be that you could retain some of your present forms to use with our system. If you will send us sample sheets of all the forms comprising the system, we will give you the best advice we can offer.

The system as outlined in the AMERICAN GARAGE & AUTO DEALER provides for the costing of your sales and so furnishes a daily financial statement. The method of costing sales makes all the difference in the world in the amount of detail in your bookkeeping. The proper system of costing sales will not involve 20 minutes additional work daily. This item is discussed in the article on Sales Tickets.

\* \* \*

## Accounting for Truck Agency.

Will you kindly favor us with sample pages of an accounting system suitable for retail truck and automobile agency

operating a service station and repair shop? Please send us prices.—H. M. Co.,

We are sending you under separate cover a folder of most of the forms for the garage accounting system. These forms are designed especially for the automobile business, but can be used successfully in the truck business also. Of course, if you are doing an extensive business in trucks it would be better for you to get forms printed especially for your business.

The writer has personally advised and installed numerous systems for truck agencies and distributors and is in a position to furnish the most practical special forms to meet your individual requirements. If you will furnish us with samples of the forms and stationery you are now using, we will be in a better position to advise you. Have you read all of the articles on garage accounting in the AMERICAN GARAGE & AUTO DEALER?

It may be that your present system could, with slight alterations, be made to give you service, or it may be that you could retain part of your present forms to use with our system. If you will send us samples of the forms you are using and give us some details of your business, we will give you the best advice we can offer.

It is the policy of the American Garage & Auto Dealer not to publish any prices. These will be furnished on request.



The advertisement is framed by a decorative border containing images of various Goodrich products. At the top left is a can of 'GOODRICH RUBBER CEMENT No. 4'. To its right is a small tin of 'Vulcanizing Patch' and several circular patches. Further right is 'The GOODRICH "JIFFY" REPAIR TOOL' kit, which includes a syringe and a needle. On the right side is a can of 'GOODRICH PLASTIC FOR REPAIRING CUTS IN TIRE TREADS'. Below that is a tube of 'GOODRICH Jiffy Solution'. At the bottom right is a can of 'GOODRICH VULCANIZING ... CEMENT No. 434'. On the left side, from top to bottom, are a tube of 'GOODRICH Rubber Cement', a can of 'GOODRICH SOAPSTONE USE FREELY', and a tube of 'GOODRICH LIQUID WOOD-BUM CEMENT'. At the bottom left is a large roll of material, and at the bottom right is a shoe with a patch on the sole. In the center, a small tin of 'GRIP-TITE' is surrounded by several circular patches.

## The Liveliest Dozen You've Ever Seen

Twelve high grade, fast selling Goodrich Tire Accessories that won't go to sleep on your shelf.

Display them up in front where they'll be seen and they'll sell like hot cakes.

Every one of them a thoroughly good, high-quality product that will do the work required of it—and more.

A constant selling line that will bring in money all year 'round.

THE B. F. GOODRICH RUBBER CO.  
*Akron, Ohio*

## Goodrich Tire Accessories

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Welding, Cutting and Brazing Practice

The Cutting Torch in Connection with the Welding Torch Can Be Put to Many More Jobs Than the Average Repairman Is Inclined to Employ It— Its Many Uses with Detailed Instructions Are Taken Up in This Article

By David Baxter

The oxy-acetylene cutting torch has almost as many uses in the garage welding department as the welding torch. In fact, the welder will find it almost indispensable once he knows the real value of the cutting torch. It will take the place of so many different tools that it has been called a vest-pocket machine shop.

Much of the work of a common drill press may be done with the cutting torch. It may be used as a punch; it is literally a power saw or shear; it will serve as a die for cutting out special shapes of metal; it will save lots of time usually spent in heavy grinding on an emery wheel. These are some of the many uses of the cutting torch and, in connection with the welding torch, it is in a small way a complete manufacturing establishment.

With it, the repairman can "punch" holes in fenders, frames, bumpers, metal footboards, and many other parts of an automobile. Or he can cut the frames as smoothly as he could saw them.

Square, round, or irregular-shaped pieces may be cut out of sheet metal from which doors, hoods, dash, or floor can be made a great deal easier than by using a shear. Circular pieces which would require hours of hard labor if cut with a saw or chisel may be cut round and smooth in a short time. And such things as tank ends, bucket bottoms, tool chests, etc., are a sinecure for the cutting torch.

The operation of cutting is simple and consists first in heating the wrought iron or steel to nearly the melting point in one spot and then directing a jet of oxygen under pressure upon the heated spot. This pressure varies with the thickness of the metal to be cut. In detail the cutting is accomplished by first regulating the torch flame to the neutral welding position. Then the neutral flame is brought in close contact with some part of the line to be cut.

It is held there until a small spot starts to melt, then the high pressure oxygen is turned on. When it strikes the heated spot, it immediately reduces the metal to oxide. As the shower of oxide commences to fly, the flame is started moving along the line of cutting in accordance with the foregoing instructions. While the torch moves onward, the sparks continue to fly.

It is not necessary that the sparks be blown straight through the metal, but there should always be a free exit for them. The preferred method is where the sparks are forced downward. The pressure, however, may be directed in any direction, unless it is very heavy cut, then the direction

which will remove the oxide as fast as it is formed should be used.

When cutting sheet metal, it is better to place the sheet flat with a space beneath it to accommodate the shower of oxidized metal. In this position, the operator may manipulate the torch to better advantage. To further facilitate the work, he will find it well to support the hose by some sort of

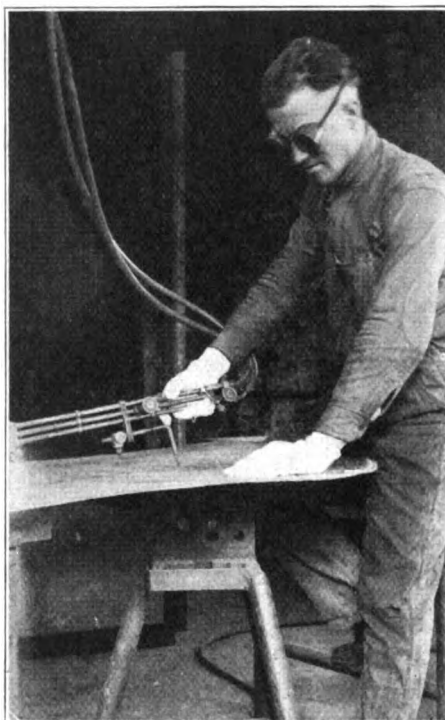


Fig. 1—The Circle-Cutting Attachment.

overhead device when cutting circles or special designs.

To assist in straight cutting, a handy arrangement can be made by clamping a flat bar of iron along the line of cutting and close enough to engage a guiding device fastened to the torch head. This guiding device may be merely a slotted piece of iron, with one end round, bolted to the torch head. Or it may be elaborated with small wheels or rollers to permit pushing the torch along the surface of the sheet. It should be adjustable in order to hold the tip just the desired distance above the metal and should be offset enough to prevent interference with the cutting action.

The whole device should be strong enough so that it will not slip at a critical moment. When in action, the guide engages the flat bar clamped to the sheet along which is drawn the cutting tip. By keeping the guide rubbing the bar, a

straight line may be cut without danger of ugly ragged parts.

In circle cutting, the torch is pivoted around a pointed support clamped to the body of the torch near the handle. The point of this support rests in a center-punched mark in the exact center of the circle. By changing the location of the device along the torch, the size of the circle may be regulated from a circle a couple of inches or less to one several feet in diameter. To cut a larger circle, the operator inserts a longer circle-cutting device. To cut a very small circle, he employs the other end of the device.

One of the simplest forms of cutting attachments is the one shown in Fig. 1. This picture also shows the hose supported overhead. The operator is cutting a circular section from a flat piece of quarter-inch sheet iron such as is used in making tanks, boilers, etc. The torch is swung sidewise around the circle blowing the oxidized metal through the sheet. This same process and device may be used for cutting heavier metal.

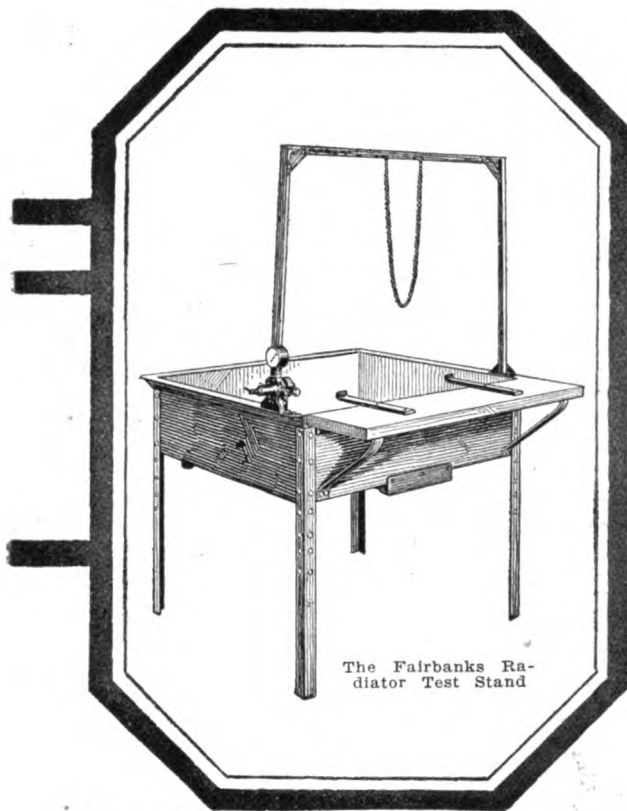
Fig. 2 shows the cutting of a heavy piece of steel. This cut was made in about one minute and severed a section five inches square. To do this job the operator employed a large size tip under heavy pressure. As the illustration indicates, there was a literal waterfall of oxidized metal.

In accomplishing this job, the operator first applied a welding flame to one upper corner of the steel until it started to melt. He then turned on the high pressure oxygen and as soon as the shower of sparks started, drew the torch in, slicing off the full thickness of metal across the bar from one side to the other without pausing.

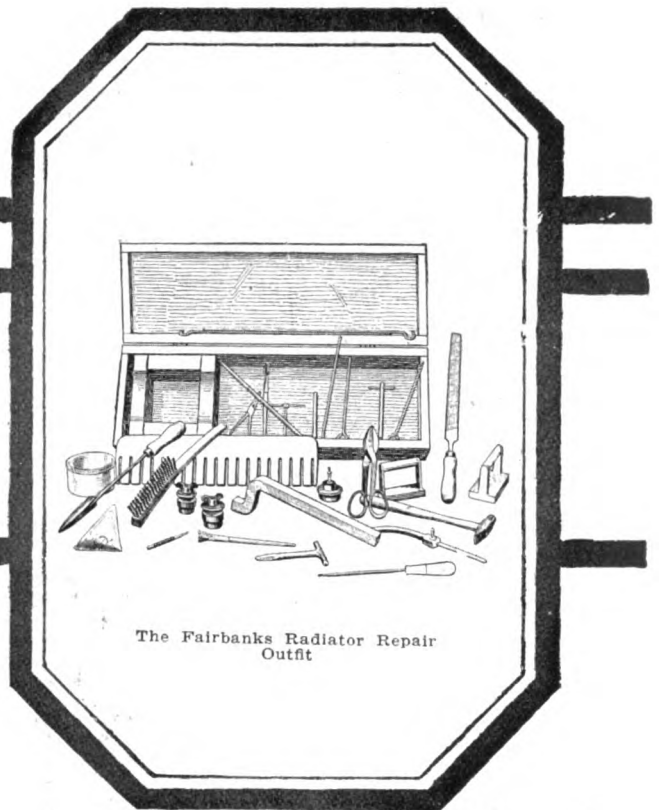
If the operator wishes to make an irregular-shaped piece of sheet metal for some special purpose, he may do so with the cutting torch. He does not have to stop, however, at sheet metal, for he can cut out almost any desired shape from heavy bars of steel. By arranging templates or guides, he can do this kind of work in quantities if he wishes.

It sometimes happens that the repairman has to grind corners from heavy pieces of metal, such as the customary bevelling of heavy steel shafting when preparing it for welding. This bevelling is easily and rapidly done with the cutting torch at a great saving of time and labor over the emery-wheel process.

It is well, perhaps, to mention that, strictly speaking, steels and wrought irons are the only metals that can be cut with



The Fairbanks Radiator Test Stand



The Fairbanks Radiator Repair Outfit

## Do You Get All the Profits on Your Service Station?

Automobile Engine Tester  
Bearing Burning-In Machine for Ford and Fordsons  
Motor Test Stands  
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Straightening Presses  
Arbor Presses  
Power Grinders  
Air Compressors  
Transmission Reaming Machines  
Special Ford Reamers  
Rear Axle Sleeve Pullers  
Radiator Test Plugs  
Piston Clamps  
Transmission Drum Clamps  
Rear Axle Pinion Gear Presses  
Pinion Gear Pullers  
Piston Bushing Reamers  
Crank and Cam Shaft Testing Machines  
Emergency Wheel Clamps  
Wheel Pullers  
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Bench Motor Clamps  
Bushings Drivers  
Speed and L Wrenches  
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Combination Electric Drills and Valve Grinders  
Servistock Shelving for Ford Parts  
Special Ford and Fordson Tools and Machines  
Magneto and Coil Unit Tester  
Lifting Irons

**Y**OU make money on motor transmission and axle repair jobs with labor saving machinery. Why lose profits by sending radiators out to repair shops?

With the Fairbanks Radiator Test Stand, placed in an odd corner of your shop, you can earn these profits for yourself.

The Fairbanks Radiator Test Stand is all-metal and will test the largest radiator. There is a gauge and safety valve for air tests; hence a definite pressure is

obtainable with perfect safety.

The tank may also be used for tire testing and will accommodate the largest tires.

This test stand and the Fairbanks Radiator Repair Outfit will take care of all radiator repairs. The Radiator Repair Outfit is especially designed for repair work on all size radiators.

Call at the nearest Fairbanks branch today for a demonstration or send for Catalogue 10.

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# FAIRBANKS

Sole Distributors for The Service Station Equipment Company, The Hempy-Cooper Manufacturing Company, The Steere-Kitson Company, The F. B. Electric & Manufacturing Company, The Bilt-Rite Manufacturing Company, and other manufacturers of Garage Equipment.



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

the torch. This is no great detriment to the garage welder, however, since most of the automobile parts are made of steel or wrought iron. Other metals may be divided, separated, or have portions removed with the welding torch. But the cutting in the true sense of the word is not practical on anything but steels and wrought irons. The cutting torch or attachment is not employed when severing other metals, the parts are simply melted in two with the welding flame.

Metal cutting with the torch is nothing more or less than a very high rate of oxidization or burning; the metal literally burns itself to a cinder. The high power oxygen jet of the torch attacks the metal and turns it to slag or oxide. As this oxide is detached or blown aside, it exposes a fresh surface for the oxygen to attack, which is turned to oxide, thus making the cutting action continuous as long as the oxygen is applied.

To make the process successful, the oxygen must be continually applied to the newly-exposed metal. The torch must be moved onward at a regular, even speed which corresponds to the rate of oxidation. Any pausing or irregular movement of the torch results in a ragged spot in the cut. The oxygen pressure must also be constant, as any fluctuation causes a break in the forward speed of the oxidization.

The tip of the cutting torch must be held at a fixed distance above the surface of the metal because any raising or lowering of the tip will cause a corresponding widening or contracting of the cut. If the tip is raised, the strip cut out will widen; if the tip is lowered, the width of the cut will decrease.

When cutting, therefore, the chief things for the operator to remember may be summed up briefly thus: Keep the torch moving onward at an even rate of speed at a fixed distance above the surface of the metal; do not permit it to waver sideways; make the forward speed as near the maximum as the rate of oxidization will permit; keep the torch in one position during the cutting—that is, the angle at which the torch is held at the start of the cutting should be maintained during the entire process.

The rate of speed at which the torch should travel is governed by the thickness of the metal, which in turn requires a certain fixed oxygen pressure. It is also governed by the size of the torch used. Since there is some difference in various torches, it makes it inadvisable to quote any set rules to follow concerning the size of torch to use and, therefore, the operator will do well to follow the tables usually furnished by the manufacturer. No specific instruction can be of much practical value along the line of tables or rules due to this variation in torches.

The distance above the metal at which the torch should be held may be regulated by the width of the cut-out section. If the

welder is not so particular about keeping the cut-out section narrow, he need not hold the tip close to the metal. However, the most economical cutting is undoubtedly done when the tip is held very close to the metal; some torches in fact ride upon the metal. But, whatever the distance, it should be constant. The theory in explanation of this is that the gas doesn't escape from the tip in a straight line but commences to diverge almost as soon as it leaves the orifice, consequently, to get a narrow cut, a narrow part of the flame should be employed.

The distance of the flame from the work-piece is then limited, since to hold it too high causes part of the oxide to scatter on top of the metal when it should all be blown through to the other side. In effect, the cutting backs up or clogs due to the

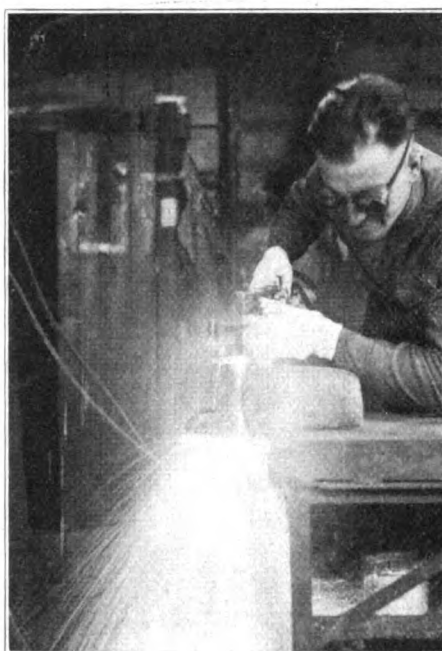


Fig. 2—Cutting Torch In Action.

spreading or curling of the oxygen, so that a good cut cannot be made when the tip is held an inch or so above the metal. Some torches cannot be used even half an inch above the metal.

Another consideration is the metal wasted by a wide cut. If the narrowest practical part of the oxygen is used, there will be less of the metal turned to oxide; less trouble due to any tendency to back up, because the full pressure of the oxygen blows through the metal; fewer sparks and less fuss.

In further consideration of the item of wavering: It is almost impossible to guide the tip along a straight line without the aid of some mechanical device. Unless the operator is particularly dexterous and has a very steady hand, he will make a cut that is more or less rough and wavy. Even in the event of his being very proficient, he cannot always make a cut as smooth as can be made with a mechanical aid.

A machine-made cut is often as smooth

as a shear cut if it is executed properly. Therefore, the operator is always advised to employ some sort of device for steadying the movement of the torch. It may be home-made or purchased ready-made. Especially in circle cutting, will the operator find the mechanical device necessary.

The proper rate of speed at which the torch should move forward may be estimated with the eye after the operator has had some experience, for he can tell by watching the flying sparks of oxide. When they are flying in a steady, continuous shower, he will know that the torch is working properly and may then test the speed by trying to increase it very slowly. If the shower of sparks continues to fly in a steadily-increasing stream, he will know that he has not been cutting at the maximum pace. As soon as the torch starts to buck or sputter, he should slacken the pace until the sparks are regular.

In this connection, however, it may be well to state that a bit of slag or other foreign matter in the steel may cause the torch to sputter without indicating that the speed is wrong. Also a rust pit or bit of scale may cause torch trouble for an instant, especially when cutting old material, without affecting the correctness of the speed.

In relation to the proper angle at which to hold the torch, it does not seem advisable to recommend any particular position since some operators prefer one while others think another angle is better. For circle cutting and straight cutting, one angle is obtained by elevating the handle of the torch while the reverse is obtained by lowering it. Two other angles are obtained by leaning the torch so that the pressure is toward the cutting, the other so the pressure slants away from the cutting.

Any one of the different positions probably has some advantage over the others, particularly one of the first two. On heavy material to be cut by hand, the latter of the second two positions is preferable since it affords better chance to watch the progress of the cutting. Of course, either position depends somewhat upon the thickness and shape of the metal.

Whichever position is taken at the start should be maintained during the entire process. Changes cannot be made without resulting in a ragged effect, which is augmented by the number of changes.

Given the proper appliances, the average welder will not find the cutting process a complicated matter. And, while he should understand the principles involved together with the fundamentals of the foregoing instructions, he may often make such minor changes as are more suited to his own particular shop conditions. For, although the fundamentals of cutting with the oxy-acetylene torch are the same, the manner of accomplishing like results may often be changed. These things are flexible within certain limits. (Concluded on page 42.)



# A Page of Big Selling Accessories for Ford Cars

Ford owners are interested in getting as much out of their car as possible in the way of service, economy, comfort and safety whether the car is used for business or recreation, profit or pleasure, and those dealers who carry these items in stock will reap the benefit of this demand.

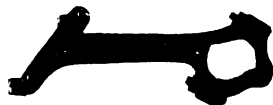
## To Eliminate Rattles

The most dangerous and annoying rattles in a Ford come from the Steering and Radius Rods. Many a noisy Ford would be quiet and steer perfectly if these rods were not loose. The Apco Anti-Rattles are the biggest selling item in the Apco line and no Ford should be run without them. The Steering Rod type sells for fifty cents a pair. The Radius Rod type fifty cents or a dollar for a complete set. Dealers' prices twenty-six cents or ten for two forty.



## To Eliminate More Rattles

The continual use of the steering wheel as a handle to get in and out of the car causes the steering column to work loose and once this happens it rattles and is very apt to



break off. The Apco Steering Column Brace is an attachment that fastens to the steering column and the dash, making the steering column as solid as a rock. It sells complete for one dollar, and once installed the owner would not be without it for many times its cost. The dealers' price is sixty-six cents or ten for six ten.

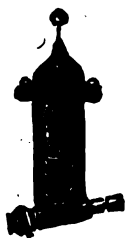
## Accident Insurance

When people unexpectedly step in front of a car it seems as though one could never reach the horn button in its out-of-the-way position under the wheel at the front of the steering post. The more immediate the danger, the more it seems one must fuss and fumble to sound the horn. There is a clever little device that places the horn button in the most natural position at the end of the gas lever, where your finger finds it instinctively and without a second's delay. This is another Apco device. Its price is one dollar and it comes complete, ready to install. Dealers' price seventy-three cents, ten for six eighty.



## Oil Supply

Many Ford owners never know how much oil there is in their car and they will appreciate this new invention which tells them at a glance just where the oil is, even at night. It will not break, it cannot leak and it never tells a lie. It is sold by most dealers, costs one dollar and can be put on in a few minutes with a pair of pliers. Dealers' price, fifty-eight cents or ten for five forty.



Some owners want an efficient oil gauge at a low price and the glass gauge shown will answer the purpose and it has been on the market for ten years. It is very large and with the exception of the metal oil gauge it is the best on the market. Sells complete for fifty cents. Dealers' price thirty-two cents or ten for three dollars.



## Muffler

When the regular Ford Muffler fills up with carbon it cuts down the power and costs money, and a missing cylinder will often cause the Muffler to burst. The new Muffler described will eliminate all of these troubles besides giving the owner a testing valve that will locate a missing cylinder instantly. The complete outfit, including pedal cable and screws sells complete for five dollars. Dealers' price three sixty-five, five for sixteen ninety-five.



## Front Axle Alignment

If the Ford steers hard and will not stay in the center of the road it is because the front axle is out of line and the only way to permanently cure this trouble is to install an Apco Front



Axle Brace or Auxillary Radius Rod which can be installed in a few minutes with a wrench. It is made from pressed steel and only costs one dollar. Made for both 1920 and earlier cars. Dealers' price sixty-six cents, or ten for six ten.

## Care of Tire Valves

Nothing is more annoying than to find that the valve stem is mutilated, that the inside cannot be removed or the cap or pump connection can-



not be attached. The tool shown is really six tools in one handle and no kit is complete without one. It costs one dollar. Dealers' price, seventy-three cents or ten for six eighty.

## A Cure for Timer Troubles

This is not a new timer and during the past three years thousands have been sold. The elimination of troubles caused by the uneven wear on steel and fibre was the principal object of the designers together with the easy starting



features and the quick, cheap replacement of wearing parts. With each timer two extra springs are furnished and this means timer service for a long time. The price complete is one dollar. Dealers' price seventy-three cents, ten for six eighty.

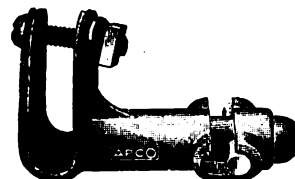
## Renewing Oil Supply

It is hard to replenish the oil without spilling it over the timer wires which will shortly rot the insulation and cause trouble. The breather shown sells for one dollar and is fitted with a screen to keep out dirt. It fastens permanently in place and cover threads on, preventing rattles. Dealers' price sixty-eight cents or five for three five.



## Jazzy Brake Rods

Noisy brake rods are common on the Ford and those owners who prize quietness will welcome the brake rod supports shown in the cut which



are self-lubricating, anti-rattling and everlasting. The installation is simple and a dollar will not buy any more comfort. Dealers' price fifty-six cents, five for two sixty.

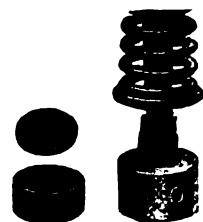
## Broken Crank Case Arms

A broken crank case arm meant a serious thing until the Apco Arm, as shown in the cut, was introduced to the Ford owner. This makes a permanent — better than new — repair in an hour instead of a day and the cost is only one dollar and fifty cents instead of twenty dollars. Most repair men use this but if yours wants to tear down the engine send to the manufacturer of the arm shown. Dealers' price seventy-three cents, ten for six eighty.



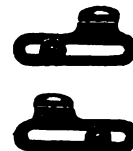
## To Quiet Valves

Most cars have adjustable valves and this is why the higher priced cars are quiet and the Fords are noisy. It is an easy matter to make the Fords adjustable with the valve adjusters shown, which can be installed in a few minutes and only cost fifty cents a set of eight with discs. Dealers' price twenty-nine cents, ten for two seventy.



## Attaching License Tags

A wire around the axle is a common way to attach the front number plate but the license brackets shown only cost twenty-five cents and they hold the plate solid and prevent rattles. Dealers' price fifteen cents, ten for one forty.



The Apco Manufacturing Company, of Providence, is the largest makers of Equipment for Ford Cars in the world and its new catalog should be in the hands of every dealer who wants business from owners who want economy, safety, comfort and efficiency from their cars. Simply drop a postal card and the catalog will be mailed promptly without charge. Most jobbers stock Apco goods. If you have trouble locating a source of supply send us your order and we will have it shipped thru some jobber near to you.

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# When Does the Farmer Do His Buying?

In View of the Prosperity of the Farmer It Is of Interest to Know When He Does His Buying—It Was Generally Thought That the Farmer Did His Buying in the Spring and Fall—Facts Which Garagemen Should Know

For years there has been discussion as to how much buying the farmer does during the summer months. It was generally conceded that he is too busy at that time to do much buying. That was a supposi-

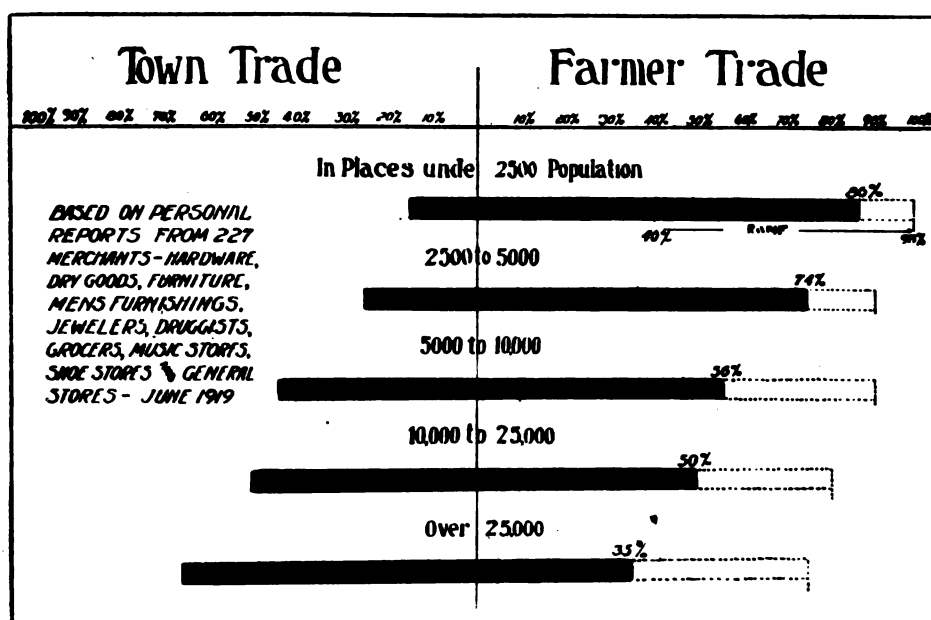
were made of selected storekeepers and bankers. The information received from these sources, together with that received through the cooperation of the editors of the leading trade papers, is valuable.

Merchants having good stores in country trading centers in their reports stated that their sales in June, July and August were 22 per cent greater than the sales during the months of December, January and February.

"The big work period is the big buying period. Machinery is wearing out, clothes are wearing out. Housewives want quickly-served foods, with more farm hands to feed. Roads are good—getting to town is easy. Entertaining is at its height. Big money is in sight. The spending is continuous."

Not only has the automobile been of help in building up farm trade in the larger towns where one finds the banks, movies, surgeons, dentists, jewelers, a better assortment of merchandise and better styles—but it has particularly emphasized the summer trade.

Where the farmer can see goods attractively displayed, he is more or less constantly exposed to the "buying urge." Chart A shows that 35 to 85 per cent of the total trade of the town merchants is with farmers. This "buying urge" is constantly fomented by the farmer's ability to get to town, and to get to see people who are, perhaps, even more accustomed

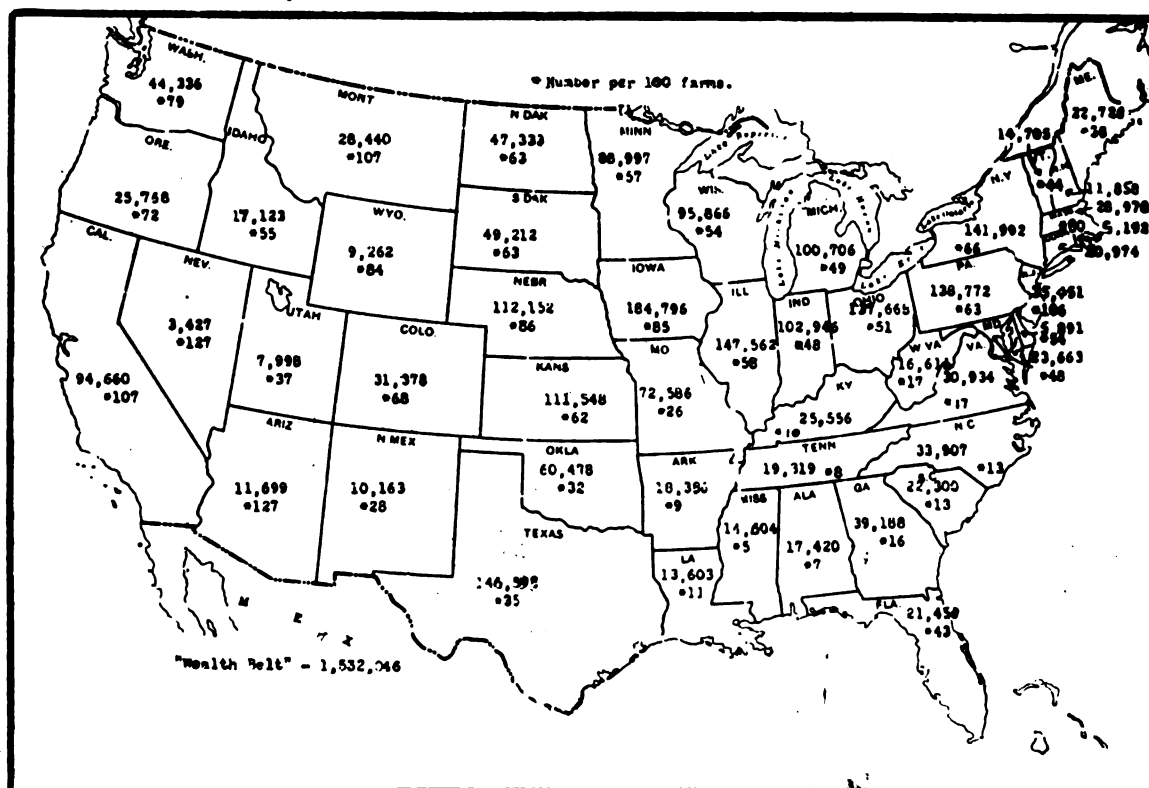


This Diagram Shows That Most of the Town Merchants Deal With Farmers.

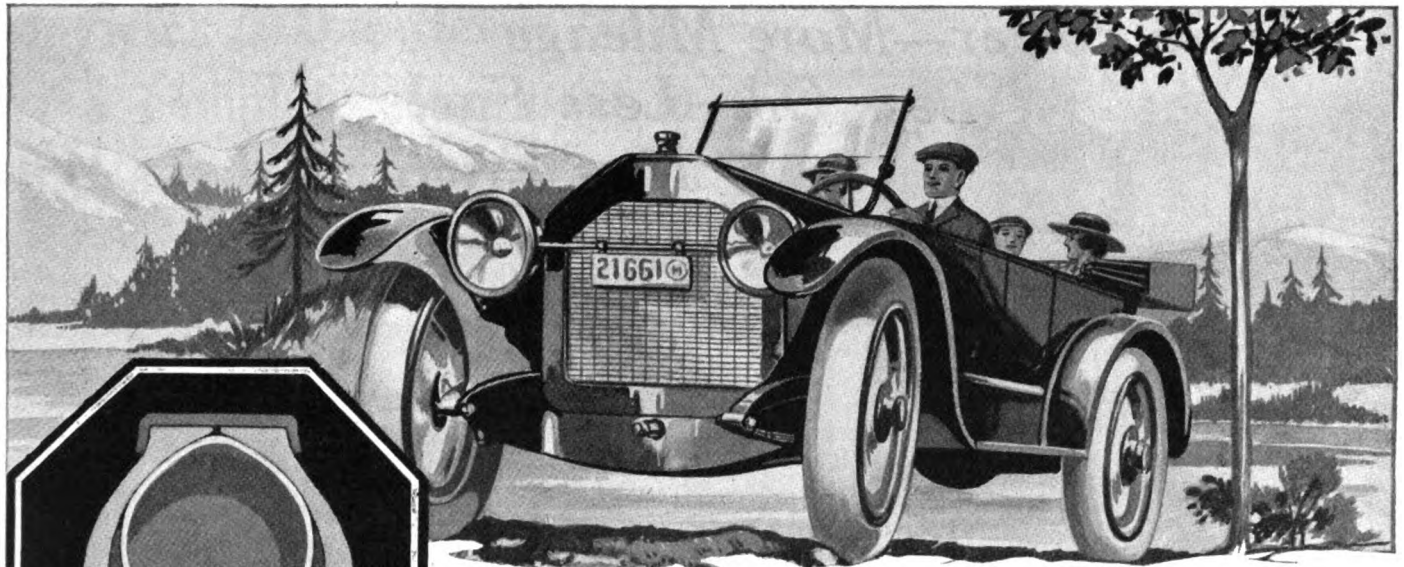
tion—and, as often happens, a supposition not based upon fact.

The Farm Journal, with a view to finding out the real condition, recently sent out carefully-worded questionnaires to general stores, hardware stores, drug stores, furniture stores, etc., in country trading centers, and asked for a detailed statement of the total business done each month in the year.

Questionnaires were also sent to bankers in the smaller towns, seeking definite statements as to the monthly deposits made by storekeepers who dealt with farmers. And in addition to these investigations, personal investigations



The Number of Automobiles Owned by Farmers Is Shown In This Chart. Compiled by the Farm Journal, and Indicates That Farmers are Big Buyers of Automobiles and Accessories.



**COFFIELD  
TIRE PROTECTOR**

# No Road too Rough for the Coffield Tire Protector

Almost any make of tire will stand up and give service under ordinary conditions. But the ceaseless bumping and thumping it gets on rough roads tends to reduce its normal mileage.

It is here that the Coffield Tire Protector demonstrates its value. It is made of pure, live rubber, **without fabric**, and fits in between the tube and the casing, with positively no friction.

It absorbs the shocks and bruises that the casing is constantly receiving, and enables the tire to deliver every mile of service that was originally built into it.

The Coffield is not a cure-all, of course. It is just what its name indicates—a protector against tire troubles, of all kinds. And this kind of protection means greater mileage for the tire.

It is not sold on the basis of being a preventer of all tire troubles. And yet, it will prevent at least 90 percent of the punctures and blowouts.

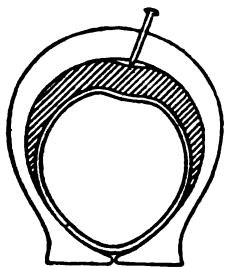
In addition to this, it backs up the casing and protects it against the shocks of the road.

If it does all these things—and it does—that is reason enough for its existence.

One set of Coffield Protectors will outlast many sets of tires; no matter how rough the roads or how hard the usage. Simply take them from the old tires and use them again in the new ones.

Thus they pay for themselves many times over by the trouble they save and the increased mileage they enable the tire to deliver.

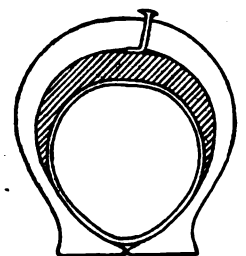
**TO DEALERS—If you do not already handle Coffield Tire Protectors, write us for our special proposition and its money making possibilities**



The above shows a nail piercing the outer casing and how the Coffield protects the inner tube.

# The COFFIELD TIRE PROTECTOR COMPANY

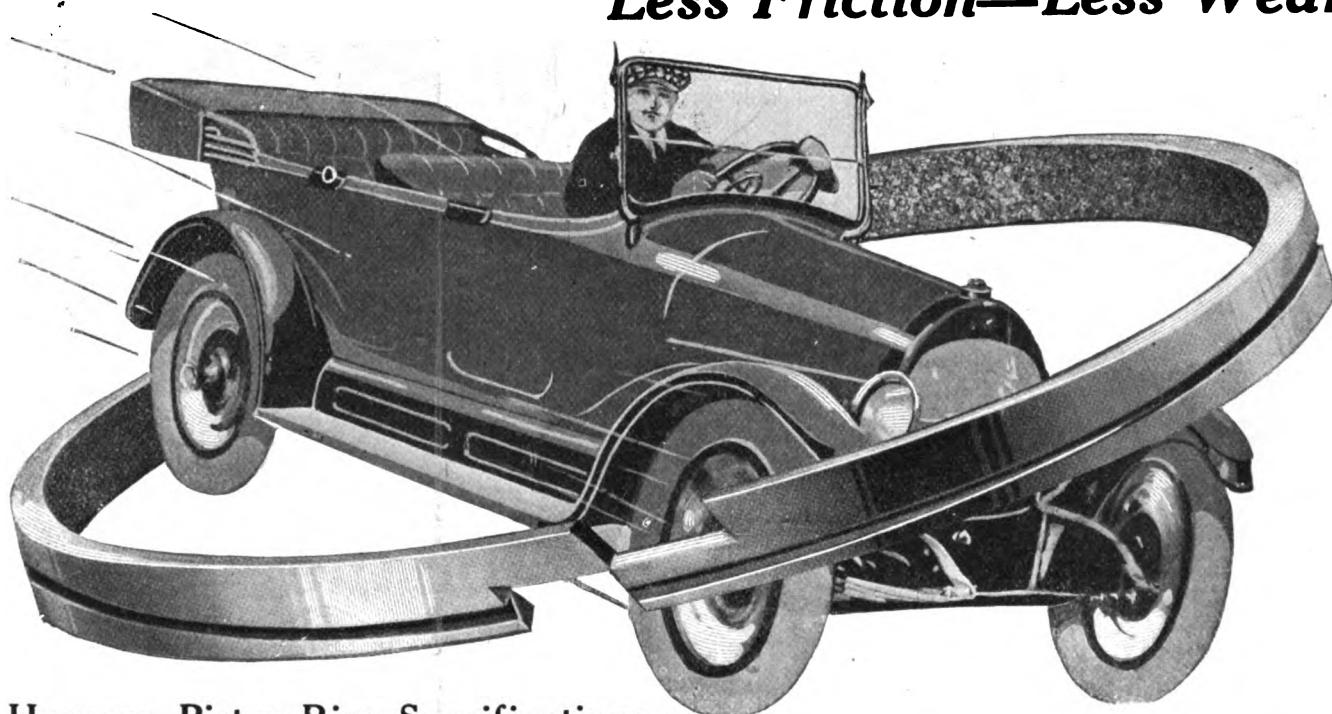
## DAYTON, OHIO, U.S.A.



The live rubber of the Coffield Protector (having no fabric) merely gives when the nail strikes it and the nail clinches between the protector and the casing.

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

**More Power—More Mileage**  
**Less Oil—Less Fuel**  
**Less Friction—Less Wear**



**Here are Piston Ring Specifications that Will Interest You.**

**Lightning Cut**—The scientific combination of the old step and diagonal cuts. When expansion creates a crevice in the diagonal cuts, the horizontal cut of the General Lightning Cut Ring locks tight, maintaining a creeping, tenacious grip. Compression cannot escape.

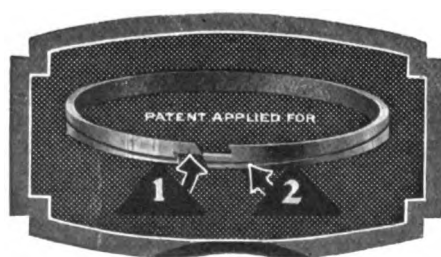
**Oil Distributing Groove**—Up and around the Lightning Cut Ring this oil groove sweeps. Oil is carried to points heretofore unreachable. *Natural wear between ring and wall is reduced to a minimum.* All excess oil is effectually scraped away by the straight edge of this groove on the down stroke of the piston.

**Individually Cast**—Not sliced from pot castings. Of fine texture, even tensile strength and uniform expansion. A natural inside finish improves tension.

**Concentric Design**—Prevents unequal ring pressure and consequent wear on cylinder walls.

**One Piece Construction**—Giving unit expansion, unit strength and unit simplicity. No material removed—therefore no oil pockets for the accumulation and carbonization of oil.

**GENERAL LIGHTNING CUT  
PISTON RINGS**



- 1 The Lightning Cut
- 2 Oil Distributing Groove

Have been introduced to the public and to dealers, garages and repair shops. Automotive engineers are invited to request full data, samples and a demonstration arranged for their convenience. As standard car equipment Lightning Cut Rings prove their superiority over ordinary rings in any test you may care to make.

*Two Cylinder*  
**GENERAL**  
 AIR COMPRESSORS

**UTILITIES SALES**

*Sales R*  
**GENERAL U**

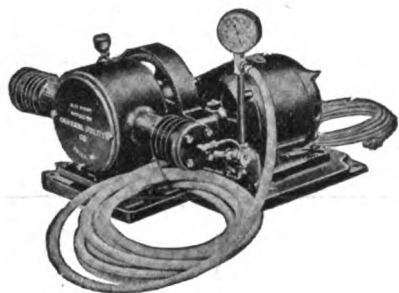
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*Utilities that Sell*

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



# The Victor is Our Handy Model— a complete equipment in minimum space



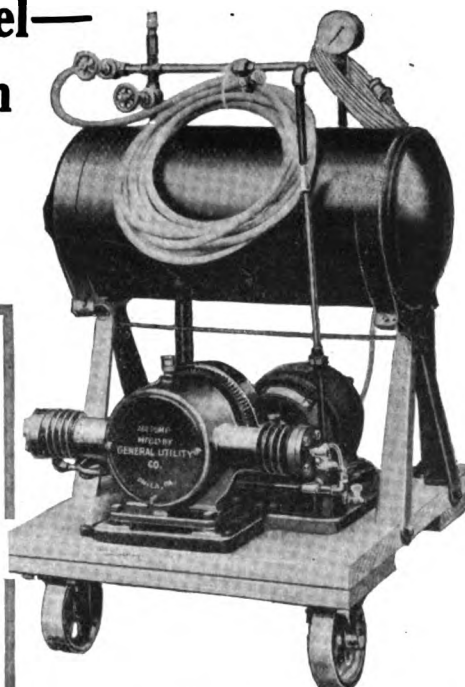
The General Two-Cylinder Air Compressor with its gear to gear connection  $\frac{1}{2}$ -horse, ball-bearing mounted G-E motor, is the standard compressor unit on all General Utility outfits.

It is the product of eight years of experience and experiment and has proved in hundreds of garages and service stations that its single stage, horizontal opposed two-cylinder construction is the most efficient design that has ever been developed. It will pump 5000 cu. inches of air per minute and do this at an unusually low cost for current.

The General Compressor shows the high quality of its construction and the perfection of its design in its remarkably low cost of upkeep. With reasonable care it will give years of service without trouble or expense.

It is rigidly mounted on a common bed plate with the motor. The motor is series wound and will start on load.

**Export Department:**  
14 Battery Place  
New York, N. Y.



Many garages are crowded for floor space and have to limit their compressor equipment to the smallest possible compass. For these we have designed the Victor Model offering every feature of convenience and efficiency that is possible with limited tank capacity.

It can be pushed about between cars. It takes up little room when not in use.

Our standard air compressor and motor are used, as on all models, affording maximum air delivery with minimum bulk and weight.

The portable model is installed on a heavy wooden truck with handle and heavy iron casters.

The tank (12"x 24") is tested to 300 lbs. and has a guaranteed working pressure of 150 lbs.

The Victor equipment is complete, assembled ready for use, including a safety valve, air gauge, oil separator, 25 ft. of the best 5-ply rubber hose, 17 ft. of electric cable and a socket plug.

Price, portable model, \$220, stationary, \$205, with automatic start and stop switch \$35 extra.

## CORPORATION

Representatives

ITY COMPANY

New Stock Exchange Bldg., Philadelphia

Two Cylinder  
**GENERAL**  
AIR COMPRESSORS

*Because They Serve*

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

than he to the modern conveniences.

The statistics received by *The Farm Journal* from merchants indicated that the diversified farming sections are where the more even distribution of trade is found. Here the farmers are in receipt of more regular incomes. These sections, therefore, offer the greatest opportunity for the dealers to do spring and summer advertising.

Chart B shows the number of automobiles owned by farmers in each state and indicates that the farmers in the "Wealth Belt" states—New York, Pennsylvania, Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska, South Dakota and North Dakota—are well supplied, as three out of five of these families have automobiles. This means that three out of five of the farmers in the "Wealth Belt" states are valuable as customers to town merchants.

Merchants everywhere reported that farmers are increasingly desirable as customers. One big factor is that the farmer now pays cash, whereas about five years ago he was largely a credit customer. Another factor of extreme importance is that the farm families are large.

The average size of the city family is 4.5 persons, whereas the average size of the farm family is 5.37 persons. This means that more business can be done with 100 country families than with 100 city families. If any extra help is employed on the farm, it is during the summer. There is also more visiting done in the country than in the city and during the vacation time of the city family, the farm family is at home, for the summer season is its period of greatest activity. These are only a few of the reasons why the farmers offer a good market.

The business man in the cities and towns of the farming district, therefore, do a much more general all-year-round business than has been supposed by the large city dealers and manufacturers. The farmers, of course, are usually more up-to-the-minute on articles that are nationally advertised than his city cousins—and when he goes to town he asks for the advertised goods. That is why we find that dealers in the smaller places generally carry a line of goods which are well known through the national advertising of manufacturers.

### Welding, Cutting and Brazing.

(Concluded from page 36.)

On heavy and light cutting, the operator who is a novice will do well to allow a little metal for stock to be ground smooth after the flame cutting is finished. This is especially advisable for circle cutting where the finished size must be accurate, and on heavy cutting where the operator is under nervous strain for a comparatively long time. The excess metal may be ground smooth when ragged edges of the cut are dressed off. Where the operator is an ex-

perienced and skillful man, very little grinding is needed on metals cut with torch.

When cutting, the torch operator should protect his eyes, both from stray sparks and from eye strain, with heavy dark-colored goggles. He should also be careful about handling the torch while the high pressure oxygen is on. It will not ignite but will provoke a fierce fire if it comes in contact with any burning object such as where a spark ignites oily waste or clothing. It is a good idea to refrain from turning on the oxygen while not cutting.

When cutting parts of an automobile that have not been removed from the car, the operator is cautioned to be careful about pointing the high pressure oxygen toward oily or greasy surfaces since oxygen forms an explosive when coming in contact with oil of any kind under certain conditions. This is aside from the danger of setting the car on fire.

A few uses to which the garage welder may put the cutting torch may prove interesting and beneficial. In the first place, during these days when nearly all new buildings contain more or less structural steel, the garage welder may make a few dollars by cutting I-beams, channel and angle irons for contractors. All of the structural steel parts may be cut to fit by the oxy-acetylene process. They need not be brought to the welding shop, for the welder may take his outfit up on any building to do the work, providing he has his oxygen and acetylene in tanks.

The process may also be used for cutting out and welding patches in boilers and water heaters without dismantling them.

To employ the torch as a power punch the welding flame is directed exactly to the center where the hole is to be punched, then as soon as this spot starts to melt, the oxygen pressure is turned on to blow a tiny hole through the metal. This hole may then be enlarged by revolving the flame in increasing circles until the desired size is obtained. After the operator has had some practice, he may cut small holes almost as fast as he could with a lever punch or hand punch, if the metal were half an inch thick.

As a side line, the welder can use his torch for cutting up all sorts of wrought iron and steel articles for junk purposes, such as old threshing engine boilers, tanks, tubing, etc. He may buy the stuff outright and cut it up for himself, or by contract.

Then he may manufacture all kinds of small tanks, tool boxes, washers, etc., either out of new steel or second hand, cutting the parts with the cutting torch and putting them together with the welding torch.

Throughout his activities with the cutting torch, it is advisable for him to study the instructions from the manufacturer concerning his particular cutting torch. These he should follow implicitly in regard to tip sizes and oxygen pressure. There are so many different torches that it is not possible to advise a standard of sizes and pressures to fit all.

### Making Stock for Bearings.

(Concluded from page 25.)

from a foundry and broken to the proper length. Fig. 7 shows a finished cast of stock as it will appear after it has been removed from the mold and the core knocked out. In Fig. 8 is shown a home-made core box. A hole is made through the two blocks which are pinned together as shown at *D*. The top half, *A*, can be lifted from the bottom half, *B*, as soon as the core is dry. The hole, *C*, in the core box will be the size of the finished core when it is removed from the box.

If one cares to make small brass castings, other than those just mentioned, it would be well to order from some foundry a bushel or so of good molding sand and have it on hand. Many times a small brass casting can be made which would take weeks to get from the factory. Likewise, a small casting of iron for an engine or a cream separator can be duplicated in brass and the customer continues using the machine, where if he had to wait for one to arrive from the factory, it would take many days and might mean a loss of many dollars to him.

I remember quite well how pleased a customer was when he came to our shop with a small broken casting which could not be replaced, because he had purchased the machine from a small mail-order concern that had gone out of business.

One day he wanted me to make a casting for a hay bailer. "Now, Mark," I said, "you are imposing on good nature and if I have to do anything like that, you can go back to the mail-order house." He laughed but told me he guessed my suggestion was a little strong. The large casting we welded with the welding machine and again he was surprised at the welding of cast iron. As he paid the bill, he said: "I 'low as how you fellers can fix most anything; thought I had you stumped this mornin'."

In case many bearings are to be made, and there are enough of them to make it worth while, a pattern can be made having a flange on it as shown at *A* in Fig. 9, the body, *B*, of course, is the same as the ordinary straight stock previously mentioned. It is not a bad plan, however, to make a flange-collar just the size wanted and slip it over the pattern already made. This will answer the purpose very nicely and save making a new pattern for each particular size of stock. These collars can range in size from say  $\frac{3}{4}$ -inch to 2 inches outside diameter, with the inside diameter the same for all. Then, should it be necessary to make a bearing with a flange 2 inches and body 1 inch, it will be but necessary to slip the 2-inch flange pattern onto the 1-inch body and make the casting as already explained.

There is always a dull time in the shop when it keeps one scratching to keep all the men working at something that will pay a profit. By making up an assortment of different sizes of bearing stock at odd times is one way to stop that expense leak.



## An Apron That's Really Acid Proof

Our chemists solved a great problem when they produced "Invincible" acid-proof fabric—not only 100% acid proof, but pliable and wear proof.

**INVINCIBLE  
ACID-APRON**

Used by the largest factories in America in acid, pickling, and nickel plating departments. Has withstood the most severe tests.

Furnished complete with neck tape and adjustable chain fastener for waist and in various sizes to suit your needs.

Send coupon for sample and full information.

## Ibsco Automatic Battery Steamer and Still

### *A Necessity in Every Battery Station*

IBSCO Steamers and Stills are all made of spun aluminum. No seams; only aluminum and brass come in contact with water. One cell or all can be removed in from three to five minutes. Water is distilled at the rate of about a gallon an hour.

No. 1 IBSCO Steamer and Still has automatic valve. Just attach to city water and turn on. The valve does the rest.

No. 3 IBSCO hasn't the automatic valve. Must be filled by hand. Outside glass gauge shows water level at all times.

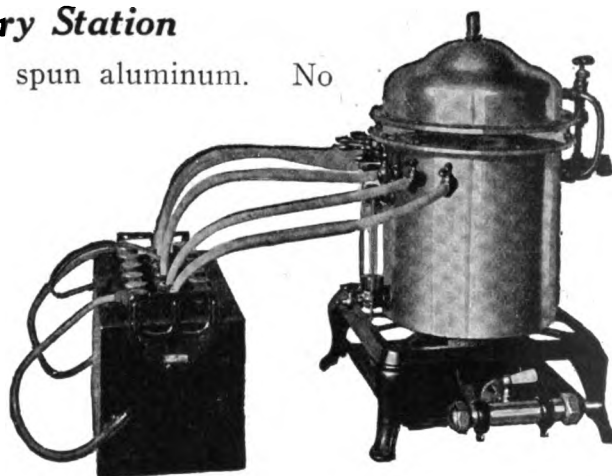
Any kind of heating plant or gas burner will operate an IBSCO.

(Sales Department)

**The Bailey-Drake Co., Inc.**

1120 So. Michigan Ave.

CHICAGO, ILL.



### COUPON

**THE BAILEY-DRAKE CO.,**  
1120 So. Michigan Ave.,  
Chicago, Ill.

American Garage  
& Auto Dealer

Send us descriptive literature and prices on the checked items.

- ( ) Ibsco Battery Steamer  
( ) Invincible Acid Apron

Name .....

Address .....

Name of Jobber.....

## How Morgan Co. Handles Repairs.

Continued from page 13)

ould be done on his car, Mr. Morgan or one of his men immediately gets in touch with the customer and obtains his authority to complete them. This gives the customer a knowledge of the condition of his car and confidence that it has been thoroughly looked over and that the Morgan people are endeavoring in every way to turn his car back to him in first-class condition.

The shop order card is then turned over to the office and a bill, as shown in Fig. 7, is made out on an adding machine. The total number of hours is obtained from the job time tickets.

[illegible]

Fig. 5—Stock Requisition on Which Is Listed the Date, Repair Order Number, Name of Car Owner, and Material Wanted, Also by Whom the Material Is Received and Issued.

Reg. No. 14604

Repair Order N<sup>o</sup>. 5657

Date Dec. 15. 1919. Mileage 7586 Gal. Gas 9

**L. A. Morgan Company**

Name Dr. Crenence Crahe Promised Friday 2.30

Claim Tag No.	Workman's Name
Grind Valves=Clean carbon	D
Clean carburetor	D
Clean and adjust ignition	D
Replace universsl joint	D
Reline foot brakes	D
Reline hand brakes	D
Replace broken gears in diff. & repair	D
	D
After above work is done road test & report general condition,	D

Road Test Report to be made in full on Reverse Side

Work completed \_\_\_\_\_ M.T.  
Shop Foreman

Car tested by \_\_\_\_\_ Walsh.  
Tester

Car ready for customer \_\_\_\_\_ R.L. Brighton  
Inspector

Fig. 4—Manila Duplicate of Shop Order Which is Placed in Leather Holder and Attached to Car—Punch Marks Indicate That Each Job Has Been Inspected and Passed by Foreman—On the Reverse Side is Given the Report of Road Test and Requisitions.

This statement has a stub which can be detached and mailed with a check when payment is made in that way.

The entering of time from job time tickets and material from stock requisitions onto the original office shop order is done each day and all is kept in an envelope. In this way the customer can be told what his bill is in a few minutes after the repair job is completed.

Mr. Morgan also believes in replacing parts instead of spending time fixing up the old ones, because the customer always gets something for his money when a new part is put in.

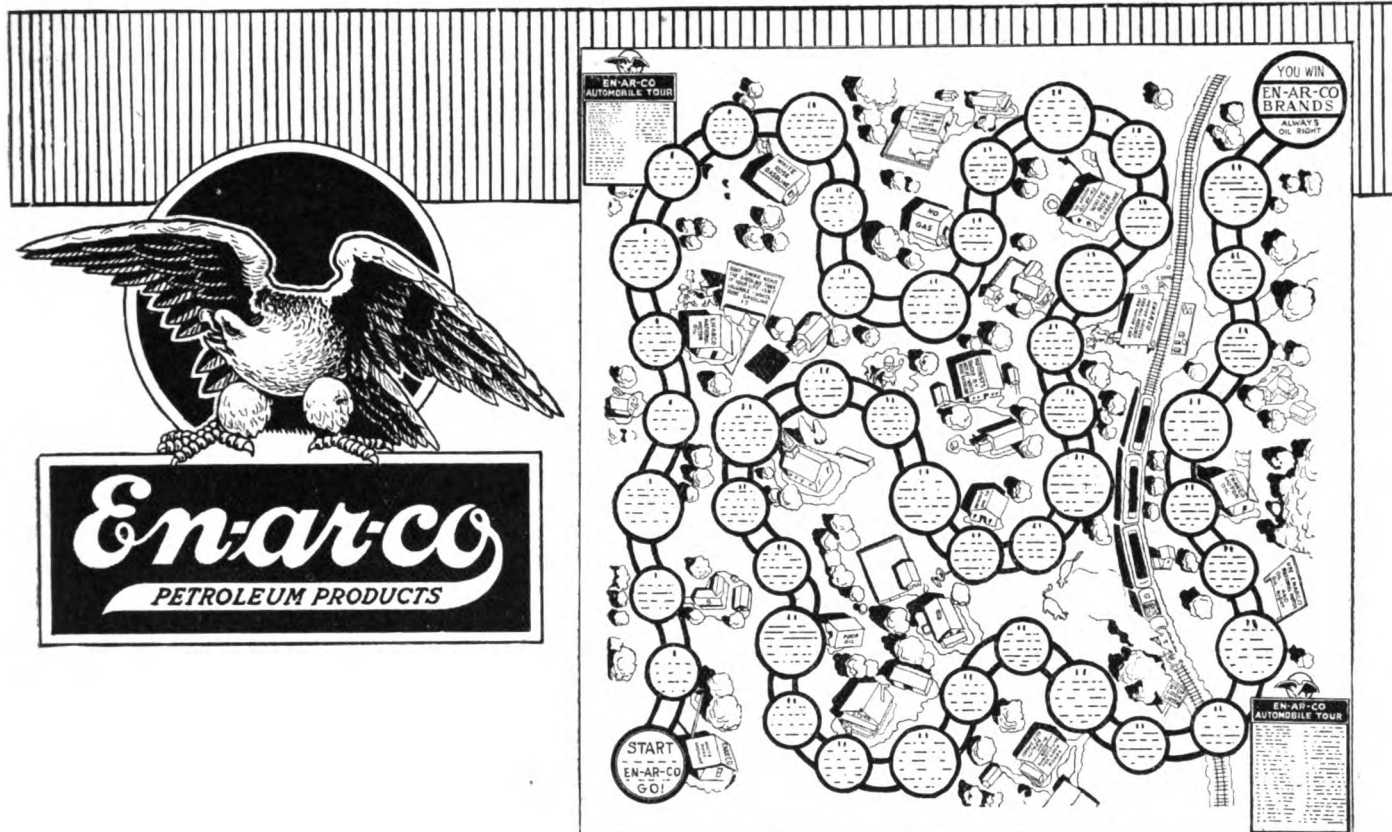
In replacing any equipment on the car, nothing but the factory standard parts are used. For instance, when a spark-plug on a Dodge is replaced, an A. C. plug is used because that is the make of plug with which that car comes equipped.

"Customers, then, cannot complain," said Mr. Morgan, "or think that some inferior part or accessory is being put on because we make more profit on it. It satisfies—and that is what service should do.

"Closely related to this also is the practice of not allowing customers to enter the shop. I believe in letting them come in and watch the work on their own cars. I invite them to come in and look at their cars while they are being overhauled. Let them rubber as much as they want. Let them tinker if they want to, so long as they confine their efforts to their own cars. They then appreciate the labor and difficulties the mechanic is under and will not be as quick to complain."

Thinking that such regular hours as 8 a. m. to 5:30 p. m. would in a way prevent him from rendering service to his customers in the evenings and





## Over 5000 Inquiries Monthly For this Free En-ar-co Game

Featured each month in our nation-wide advertising campaign is the fascinating game pictured above. It is a game in which autos compete in a cross country race. Old and young alike enjoy it.

Each month we have more than 5,000 requests from auto, truck, tractor, engine or motor boat owners for this FREE game. Each game is a constant reminder of En-ar-co Motor Oil and other En-ar-co products.

We also furnish each dealer with a quantity of these games. He furnishes us with a list of the motor car owners in his locality. We, in turn, write these owners urging them to call at this dealer's store for a free game.

Think what this means!

You are immediately identified as the En-ar-co dealer in your locality. You get the full benefit of the thousands of dollars we are spending in advertising. You get the opportunity to talk with these oil users. All of which means the building up of an ever increasing business.

En-ar-co products need no introduction. They have for years been acknowledged by experts to be of the highest quality. Scientifically refined, the high quality never varies. An En-ar-co user never changes. And he makes new users.

Write us today for detailed information regarding our plan. Let it do for you what it has already done for thousands of En-ar-co dealers all over the country.

THE NATIONAL REFINING CO., 2058 Rose Bldg., Cleveland, Ohio

## En-ar-co Motor Oil

White Rose Gasoline  
En-ar-co Motor Grease

National Light Oil  
Black Beauty Axle Grease

THE NATIONAL  
REFINING CO.  
2058 Rose Bldg.  
Cleveland, Ohio

Gentlemen: Please send me full detailed information as to your dealer plan and advertising helps.

Name.....

Address.....

City..... State.....

I now sell.....oil

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

on Sundays, we asked him to explain how he handles his service.

"During the week," Mr. Morgan answered, "the service truck is used for general work. In addition to this, a motorcycle is used on small errands for small parts that are required in a hurry and also on repairs which are done outside, or, what we call 'first aid' calls, should a customer be stalled with some minor trouble. This form of travel is much cheaper than

the truck and besides much quicker.

"When anyone is in trouble in the evening or on Sunday, he calls me up and if I am at home, I go out and fix the trouble or tow the car in."

### Truck Freight Terminals for Highway Transportation.

Freight terminals designed and operated exclusively for motor trucks in the large cities of the United States, will be the next stage in the develop-

ment of highway transportation, according to R. E. Fulton, vice-president of the International Motor Co., manufacturer of Mack trucks.

"With appropriations that have been estimated to total nearly a billion dollars available for building roads in 1920, it is only necessary to enlarge highway construction facilities before we have a comprehensive network of trade arteries that will bring goods from hitherto undeveloped territories into large cities," says Mr. Fulton.

With this increase in the number and capacity of highways will come increased demands upon the traffic resources in cities. In order to distribute freight more efficiently, motor truck freight terminals for handling small shipments similar to the railway terminals can be established, each to serve as a clearing house where outgoing and incoming loads can be assembled and distributed.

### Motor Truck Transportation Is Increasing in England.

The extent to which road transportation is increasing in London is reflected in the number of advertisements for road transportation service which appeared in a recent issue of the London Times.

In the classified advertisements under "Road Transports" 26 individual advertisements for transportation work and haulage contracts appeared. One advertisement which was particularly impressive read as follows:

"ROAD TRANSPORT—SIX LORRIES WEEKLY IN LONDON, will accept loads, part loads for Bath or Bristol—F. Reed & Co., 28 Queen Square, Bristol, Telephone 343."

Another advertisement which shows the extent to which road transportation is increasing read as follows:

"ANY DESCRIPTION OF HAULAGE UNDERTAKEN. One to seven tons removed per journey. Distance no object. Door to door. No delay. London work a specialty—Apply Devitt & Waller, 16 Lombard Rd., Battersea, S. W."

The time is coming in this country when high freight rates and good motor truck service will establish definite routes throughout the country, and persons who have any haulage to be done will consult their local newspaper's classified advertisements for transportation service.

Repair Order No. 5657		Sell	Cost
4 Qts Cyl. Oil, at 30c		1 00	
2 Lbs Waste at 25 Lb		50	
8 Lbs Grease at 25 Lb		2 00	
Miscellaneous Supplies, Etc.		1 55	
4 engine valves @ 1.07		4 28	
5 valve guide		1 25	
1 set carb. gaskets		90	
universal joint		11 00	
6'6" emergency brake lining		5 20	
7'6" foot " "		6 75	
1 pinion gear		9 83	
1 ring "		3 63	
1 propeller shaft		7 25	
1 " " bearing # 3131		3 56	
1 " " cup # 3120		1 42	
1 axle drive bearing # 255		4 13	
1 " " cup # 2530		1 29	
1 cyl. head gasket		68	
1 rear main bearing felt		15	
1 diff gasket		32	
4 sq. cotter rivets		40	
1 brake release spring		10	
4 universal joint bushings		1 28	
5% War tax		3 44	
Total Parts, Accessories, Etc.		72 41	
40 Hours Labor at 1.25 per Hour		50 00	
TOTAL BILL		122 41	

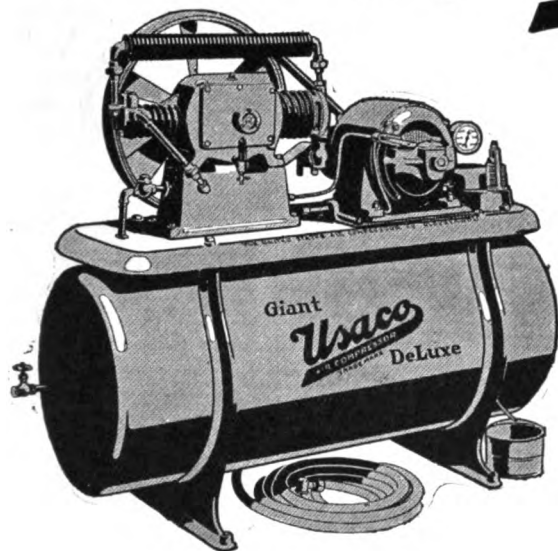
I accept above charges as correct in every detail and agree to pay for the same in full.

Signed B. Brane

Address 520 Beacon St

Fig. 6.—Reverse Side of Office Shop Order on Which is Listed Each Day From Stock Requisitions the Material Used and From the Time Tickets, Number of Hours of Labor.

# Two Stage *Usaco* Air Compressors



**The Usaco Giant De Luxe  
Compressor Capacity,  
7 Cu. Ft. per Min.**

This unit differs from the Standard De Luxe only in having greater compressing capacity, a more powerful motor and a tank with double the capacity of the Standard. Particularly adapted for the gruelling service encountered in inflating giant truck tires, a service which it handles with remarkable speed and ability.

Also furnished in portable type.

**The Usaco Standard De Luxe  
Compressor Capacity,  
4 Cu. Ft. per Min.**

Similar to the Giant, illustrated above, is a completely automatic and self-contained unit of the very highest quality. It furnishes high pressure air suitable for tires of all sizes and pressures, in great volume and is quiet running and foolproof.

Also furnished, if desired, mounted on wheels to provide easy portability.

## *How the Usaco Unloader Protects the Motor*

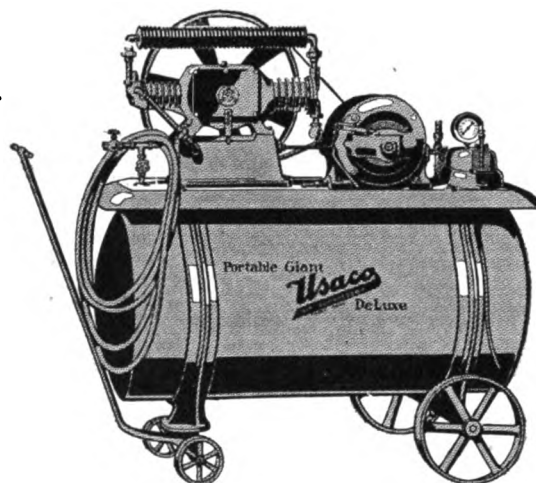
ONE cannot observe a Usaco Air Compressor at work without being definitely convinced regarding its remarkable ability and general all 'round efficiency.

Regardless of pressure requirement or severity of service, a Usaco compressor accomplishes its work quietly and without the slightest signs of labor or overheating.

After the motor stops pumping, having raised the tank pressure to the proper point, there is a "sharp snap", followed by a "sudden rush of air."

It is the operation of the automatic pressure release, a Patented feature of Usaco units, the use of which has introduced a new standard of reliability not heretofore known in air compressors by eliminating a common cause of motor inefficiency.

This is but one of numerous improvements and refinements incorporated in Usaco Two Stage Compressors as a result of many years of experience—desirable features which combine to produce units generally recognized as the most efficient in the world.



## *The United States Air Compressor Co.*

**6542 Carnegie Ave. Cleveland, Ohio**

In writing for literature and prices mention the name of your Jobber.

Inquiries desired regarding our plan of cooperating with Jobbers.

Please send literature advertised in American Garage & Auto Dealer to name written on margin. My jobber is.....

### Semi-Trailers and Tractors Taxable Under New Ruling.

The Treasury Decision approved March 3 and just issued by the Commissioner of Internal Revenue, has reversed the rulings of last year with regard to tractors and trailers forming a semi-trailer combination.

The act itself specifically exempts tractors from taxation and nowhere mentions trailers or semi-trailers. The regulations issued last year say "the act specifically exempts tractors, even if sold in combination with a trailer," and also says: "Automobile trailers, regardless of the number of wheels which they may have, are not parts of or accessories for automobiles."

How completely the revenue office has reversed itself is seen by comparison of the foregoing with the new decision just issued in which it is held that a tractor is a machine "designed to draw or pull," but that "tractors or semi-tractors which carry a portion of the load are taxable as automobile trucks"; that "trailers are not taxable" but that "so-called trailers or semi-trailers so designed that a portion of the load or weight thereof is carried

or borne by the tractor or semi-tractor are taxable as parts of automobile trucks."

Under the law, automobile trucks are taxable at 3 per cent and automobile parts up to 5 per cent. However, the new decision states that "an automobile truck or automobile wagon formed by joining together a so-called tractor or semi-tractor and a so-called trailer or semi-trailer is taxable as a whole as an automobile truck." That is at the rate of 3 per cent, but when the two are "sold separately, the so-called tractor or semi-tractor is taxable as an automobile truck or automobile wagon (3 per cent) and the so-called trailer or semi-trailer as a part" (5 per cent).

When a tractor is not a tractor and a trailer not a trailer is a question that would require a Solomon to explain.

### Chamber of Commerce Seeks Relief for Shipping Conditions.

The National Automobile Chamber of Commerce at a recent meeting took steps toward relieving the critical shipping conditions of the railroads.

### I Bulieve in Pluggin for Our Garaje.

(Concluded from page 17)

bizness wood stop if you diddent cum in at all." That gink gets my gote. I hait him and he knoze it. Ile get eeven with him sum day yet.

"What about customers?" I askt him. "I don't care how hard it is for me to get in. Ime young and strong, but sumtimes customers is ladies and they might not be so strong as me, and if the dore is hard to open, they mite go sum plase else."

What dyou think that guy sed? He sed, "Let em go. If they go to Dunning theyll find his dore is worse than ours."

"There," I sayz, "You know Dunning's dore is hard to open becaws you notist it, but you never notist our dore that is just as bad. Why dont you taik the moat out of your own eye?" I thought that Bible kotashun wood get him, but even the Bible diddent faze Persy none. He just sed,

"Tel it to a mareen. It aint my dore and if the boss likes to have a dore that it taiks an ax to open, then all the eezier for me becaws there wont be so much work for me to do."

Say, that guy gives me a pane. What dyou think of a feller that dont care enny more than that about his garaje getting bizness. If a feller dont care, why don't he go to sum plase where he will care? If I was the boss and had a man like Persy, Ide tel him where he cood go so heed care all rite if he aint maid of asbestus.

When Ime working for a man, Ime working for him. Ime that way. If I diddent like to work there, I wood-ent.

But if Ime working in a plase, Ime going to do everything I can to help that plase get bizness becaws while Ime working there I figger that its part my garaje and if I dont help it along I aint ernaling my munny and ennyway if I nock the garaje Ime helping sum other garaje and maiking my own job shaiky.

Why, if all us fellers in this joint and Dazie too, of course, wood get nocking the plase, it woodent be long before bizness wood all be gone and then where wood our jobs be? Ime for a plase or Ime agenst it and if Ime agenst it, I ain't going to stay there. Ime that way, Peter.

Yours fratirnully,

BILL.

Mr. C. Crane.

Address

Dorset, Vars.

Telephone, Brookline 1-2222

Mr. C. Crane,

To L. A. MORGAN COMPANY, Dr.

DODGE REPAIRS

All Work under the Personal Supervision of L. A. MORGAN

Formerly General Foreman, Dodge Bros. Car Service Station, Boston

9-11 PEARL STREET, BROOKLINE, MASS. 2-24-20.

R. O. 5627

R. O. DAY

5627 12/13

4 qts. cyl Oil

2 lbs. waste

8 lbs. grease

Misc. Supplies

4 engine valves

5 valve guides

1 set carb. gaskets

1 universal joint

6'6" emergency brake lining

7'6" foot brake lining

1 pinion gear

1 ring gear

1 propellor shaft

1 " " bearing #3131

1 " " cup 3120

1 axle drive bearing 255

1 " " cup 2530

1 cyl. head gasket

1 rear main bearing felt

1 diff. gasket

4 doz. copper rivets

1 brake release spring

4 universal joint bushings

54 car tax on parts

40 hrs. @ 1.25

1 00

50

2 00

1 55

4 28

1 25

90

11 00

5 20

6 75

9 83

3 63

7 75

5 56

1 42

4 13

1 29

68

15

32

40

10

1 28

3 44

50 00

122 41

Grind valves, clean carbon.

Clean carb. clean & adj. combustion

Replace universal joint

Re-line foot brake: Re-line

Re-line largest replace broken gears in

gears in diff. & prop. sh.

Re-adjust all pin. clutch,

Re-adjust, road test, etc.

When paying by Check

enclose Stub only.

Terms CASH.

All Bills due upon presentation.

Fig. 7—Invoice Which Is Presented to Customer and on Which Is Copied From the Office Shop Order, the Material and Labor—Stub Can Be Detached and Mailed With Check.





## Why Mechanics Approve It

**T**HERE has long been a demand from mechanics and motorists for an efficient piston ring having the quick-seating feature of a narrow ring, with the wall tension of a wide ring.

It is obvious to any mechanic that when the BURD Quick-Seating Piston Ring is installed in worn cylinders, the outer edges will lap in more quickly and conform more nearly to the contour of the cylinder wall than any other type of piston ring.

Mechanics know also that it is desirable to minimize the loss at the opening of the piston ring to prevent leakage and carbon troubles. BURD Quick-Seating Piston Rings are installed to fit snugly—the points just meeting—no clearance between the points being necessary. They therefore indicate the minimum of opening after seating has been accomplished.

The BURD Quick-Seating Piston Ring is of the step-joint type, the outer surface—which comes in contact with the cylinder wall—having a channel .002 of an inch in depth in the center of the face, and raised edges which lap in quickly, seating perfectly with a hard, glass-like surface in harmony with the cylinder wall in about one-fifth of the time required to seat other types of piston rings.

The channel in the center carries an oil film that prevents leakage during the process of seating and insures perfect lubrication.

*BURD Quick-Seating Piston Rings are made in all sizes and oversizes for practically every make and model of gasoline engine. List Prices: Sizes up to and including 4 inches, 60c each, and sizes over 4 inches, up to and including 5 inches, 70c.*

**Order from Your Jobber or Write Now for Directory of Sizes, Literature and Dealer's Price List**

**BURD HIGH COMPRESSION RING COMPANY, Rockford, Illinois**

### Kerosene Tractor Lubrication.

(Concluded from page 23.)

this button having at its lower end the cam, *K*, which controls the throw of piston, *J*. The lower plunger, *F*, takes the oil from the pocket in the sight-feed chamber under nozzle *L*, and forces it to the point to be lubricated through tube *A*.

As mentioned before, manufacturers are not uniform in their advice on how often parts should be lubricated, and oil or grease renewed, so the recommendations which follow are given in an attempt to give the garage and repairmen something definite on which to advise, or for their own benefit in connection with repair work.

These recommendations are based on hours of operation, because a tractor engine generally performs under nearly full load and the same conditions and, consequently, so many hours of operation represent certain power consumption, part of which is used to overcome friction.

#### Engine.

The oil in the crankcase should be replenished every four hours of operation and should be renewed after every 10 to 25 hours of operation, depending on the conditions of the engine. Drain the oil completely and fill the crankcase with a gallon of kerosene. Then turn motor over for a few minutes and drain. This helps to wash out the sediment and gum that might form from high temperatures.

This frequent renewal is necessary on account of kerosene and water condensing and working past the piston rings into the crankcase and contaminating the oil. Tests on tractor engines using good lubricating oil, show in seven hours' time an increase in the amount of oil in the crankcase of three pints, mostly kerosene with some water.

The grease cup on the water pump should be turned down about two turns every three hours of operation. This will also prevent leakage at the stuffing box.

If the fan is provided with an oil container, heavy gear oil should be used and should be replenished every 40 hours of operation. If grease cups are used, they should be given two turns every four hours of operation.

The commutator on the magneto of a Fordson tractor should be lubricated every four hours with special dynamo or light machinery oil. A few drops is sufficient. All other types of magneto ignition should receive a few drops of oil every eight hours of operation. The governor should be oiled every four hours of operation.

It is a good plan to squirt oil very thoroughly on the valve operating mechanism after starting the motor in the morning.

#### Clutch.

Keep shifting collar well oiled. Turn grease cup down twice every day and refill. Pins and other bearings, also all joints on the clutch lever and rods, should be oiled regularly every eight hours. The

cone clutch leather surface should be dressed with Neatsfoot oil after every 40 hours of operation. The enclosed multiple disk clutch should be washed out with kerosene and lubricated with clutch oil after every 40 hours of operation.

#### Transmission.

For the lubrication of enclosed gears, oil should be used. The oil should be light enough to flow to all working parts freely. A good mixture can be made from  $\frac{1}{4}$  cup of grease,  $\frac{1}{4}$  engine oil and a half-handful of graphite. Fill the case to about one inch below shaft.

The level in the case should be examined after every 40 hours of operation and should be kept at the proper level. After every 160 hours of operation, the lubricant should be renewed, first washing the case out with kerosene and examining the condition of the gears.

The fibre on friction drive transmissions should be lubricated after every eight hours of operation with thresher hard oil or engine oil.

The same general instructions apply to the differential when this is combined with the transmission.

#### Wheels.

Fill hubs with cup grease every 40 hours and give grease cups two turns or oil every four hours.

#### Chains.

The chains should be oiled or grease applied with brush every four hours when land is dry and not sandy. Every 150 hours of operation, sprockets should be taken off, cleaned, and soaked in hot tallow and graphite.

#### Steering Gear.

Fill gear case with grease and oil mix-

ture every 40 hours of operation. Turn down grease cups every eight hours of operation. Oil hand-wheel shaft bearings every eight hours. The center pivot should be oiled every four hours. The grease cups on the steering knuckles should be turned down and filled every four hours.

All small levers, such as ignition adjusting lever, governor control rods, carburetor adjustments, lever throttle rods, gear-shifting levers, etc., should receive a few drops of oil regularly every eight hours.

The question of the beneficial effect of graphite in greases and oils for lubricating the running gear assembly of an automobile or tractor is one often asked.

A series of tests conducted by the Automobile Club of America show that graphite is an efficient lubricator.

It cannot, however, be regarded as a true lubricant, but can be used with success in plain bearings, as it fills in the pores in the surface and allows the true lubricant to operate efficiently.

The use of graphite for ball-bearing lubrication is not advisable. A modern well-made ball bearing has no scratches and its perfect finish shows no irregularities when magnified 100 diameters and, besides, graphite would not eliminate them, as there is a considerable difference between the sliding action of a plain bearing and the rolling action of a ball bearing.

Graphite, moreover, has a tendency to pack in the ball retainers and raceways and a bearing which has been lubricated with graphite grease generally has a distinct wavy appearance in the ball paths.

According to one authority, the use of graphite in ball-bearing automobile transmissions, wheels, and rear axles is advisable only if the increased efficiency and life of the gears offset any possible harmful effect on the bearing.

That it does the latter is proved by experience and tests and its use is therefore recommended.

In connection with the reduction in friction of lubricating oils and greases by graphite, it is of interest to know that tests show that the proportion of graphite necessary is only one cubic inch (two tablespoonfuls) in three gallons of oil. A greater amount adds nothing to the efficiency of the lubricant.

### 70 Years of Age—Great Believer in the Steel Farm Horse.

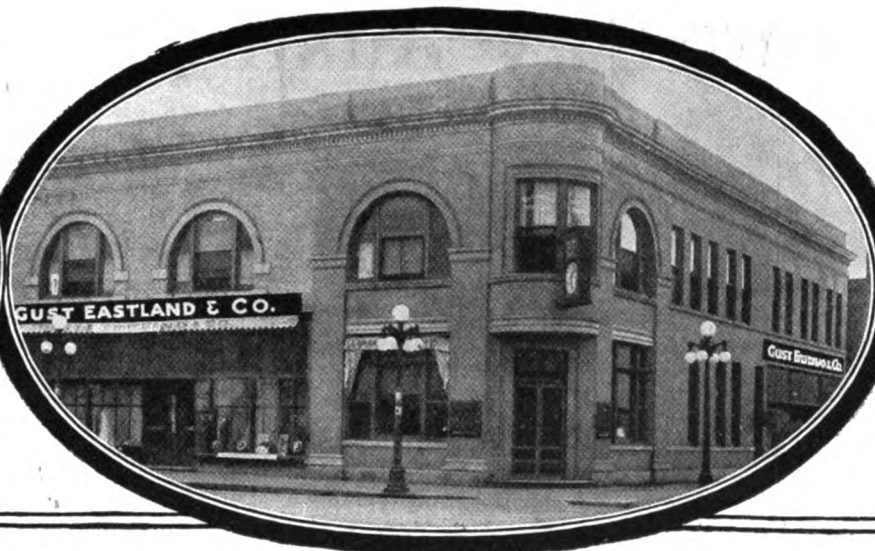
An interesting item has come to our attention concerning a citrus rancher of California to whom the evolution of agriculture has brought a keen enjoyment of life. This rancher is 70 years old and does almost all of his own work on his ten-acre place. He gives the tractor which he drives as the reason for his interest in his farm work. Until the arrival of the tractor, he found the care of his orchard was a little too much for one man, but now things move along quickly and easily.



This Photograph Shows How One Repair Shop Gets Rid of the Exhaust Gases When Tuning-Up Engines—The Pipe Shown Is Connected by a Heat-Resisting Hose to the Exhaust Pipe of the Car and Has an Outlet Outside of the Building—Each Branch Pipe Has a Butterfly Valve (Check Valve) Which Prevents the Gases From "Backing Up."



Gust Eastland



C. R. Olson

## Farm Journal Advertisements Boost This Firm's Business

Here's another live, up-and-coming "Farm Journal" store!

Gust Eastland & Co., Cambridge, Ill., are just one of a host of wide-awake merchants who understand the great advantage in selling Farm Journal advertised goods. 1,382 of our prosperous subscribers live within the trading radius of this store. They are good customers because they *know* the goods that Gust Eastland & Co. sell, by seeing them advertised in The Farm Journal.

Right near *your* store are several hundred Farm Journal readers. Get their trade by making known the fact that you sell goods advertised in The Farm Journal.

### Representative Farm Journal Advertisers Include—

Weed Tire Chains  
Cleveland Tractors  
Ever-Tyte Piston Rings  
Goodrich Tires  
Hassler Shock Absorbers  
Maxwell-Chalmers Automobile  
Leak-Proof Piston Rings  
Diamond-Grid Batteries  
Racine Tires  
Packard Trucks  
Stewart-Warner Speedometers  
Willys-Overland Cars  
Firestone Tires  
Goodyear Cord Tires  
Federal Motor Truck  
Raybestos Brake Lining  
Exide Batteries  
Case Tractors  
Bosch Magneto  
Pennsylvania Vacuum Cup Tires

# The Farm Journal

Moves most goods because read by most farm people — 1,050,000 circulation a month

CHICAGO  
1513 Mallery Bldg.

PHILADELPHIA  
Washington Square

NEW YORK  
15 East 40th Street

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Night and Day Business Getters

Does an Electric Sign Pay?—"Why Don't You Ask Pershing if He Likes the Army?" Answered a Garage Owner—"The Initial Outlay and Cost of Keeping It in Shape Is Small in Comparison with the Business It Brings In"

By Einar Graff

"Does an electric sign pay a garage?" This question was recently put to numerous garage owners who use electric signs, and it was surprising to find out that, in the opinion of the average garageman, the question was needless.

"Why don't you ask Pershing if he likes the army, or Bryan if he would like to be president?" replied a Chicago garage owner who had a blue porcelain electric sign in front of his place of business. "I paid money to have that sign put up and I pay money for current to keep it up, and as long as I am in business it will stay up. It will remain there because it brings me business every day and night, sometimes more business than I can handle.

"The initial outlay and cost of upkeep is small in comparison with the real money it is bringing in. Automobilists can see this sign for several blocks on either side of the garage. When an automobilist 'needs a friend,' he looks for a garage. He goes to the first one in sight, and he seeks it by looking up and down the street for a sign."

This garage owner's remarks were typical of those made by others whose places were equipped with electric signs.

Fred Daniels, manager of the Terminal garage, 4404 Broadway, Chicago, declared he had first come to the garage ten years ago. His directions for finding the place were to look for "the electric sign hanging out in front."

"Our sign is a big one, 104 square-feet," declared Mr. Daniels. "Since it is not porcelain, we have to have it painted every year. That costs \$45. Then the city's fee is \$15.60 for inspecting it. It has many bulbs and uses considerable current, but believe me, it pays. Automobilists pass other garages down Broadway, that haven't electric signs, to come to our place.

"Some nights we are so busy that we have to turn away customers. They come in from everywhere, wanting repairs, gasoline and storage. The sign attracts them."

Instance after instance could be cited where electric signs brought prosperity to garages.

In a town of five thousand in central Illinois, a garage without a sign was located on the main highway at the entrance to the town. Touring automobilists going through the city passed by the garage because they didn't know it was there. On one of the side streets leading off the main thoroughfare was another garage, but the owner had erected a large blue porcelain sign made by the Federal Electric Co.

This sign could be seen equally well during day and night. Everybody in town had seen the sign and knew where the garage was. The sign gave the garage a prosperous, progressive, business-like air, and when the tourists asked the townspeople where they could find a garage, they were invariably directed to the one on the side street. Although situated on an off street, this garage got the business of tourists



A Good, Well-Placed Sign Is a Perpetual Business Builder.

who had passed by a competitor far more favorably located.

How does the average automobilist regard the garage sign? In the words of one automobilist, who has driven a car for 18 years, they are often a "Godsend."

In 1902, when red automobiles embellished with many brass fittings were referred to by reporters as "devil cars," he bought his first car, and he has had one ever since.

"In my own neighborhood, I always know where to find a garage," he said, "but how often am I in my own neighborhood when I need garage service? Time and time again when I have been stalled because of the need of storage, gasoline or repairs, I have scanned the streets for a garage sign, and at night the sight of an illuminated sign has often brought joy to my heart.

"Again when in a strange town, seeking a garage to store my car for the night or to obtain other service, I generally go to the garage I see first, and nine times out of ten it is an electric sign that directs me. Since the community is strange to me, one

garage is as good as another. When the hour is late and I am wearied after a day spent in the automobile, an electric sign reading 'GARAGE' certainly gives me a warm and friendly greeting."

These remarks are characteristic of those of most automobilists.

A porcelain blue and white enameled sign, such as is manufactured by the Federal Electric Co., is claimed to be the most economical to maintain. It never needs to be painted and it will last indefinitely. When it becomes soiled, it can be washed and made spick and span with soap and water.

## Reasons for Storing Gasolene in Underground Tanks.

The prime reason for advocating the storage of gasolene underground is from the standpoint of safety. Another good reason which is important to the motorist is that gasolene stored beneath the ground is maintained in its full power, free from evaporation or deterioration.

When gasolene comes from the refinery, it contains what is called a chain of boiling point fractions, starting at, say, 100 degrees and continuing up to perhaps 400 degrees. It also contains the correct proportion of low boiling point fractions to insure easy starting in any temperature—the correct proportion of intermediate boiling point fractions to insure smooth acceleration—and the correct proportion of high boiling point fractions to give the maximum power, speed and miles to the gallon.

It can be readily understood that gasolene above ground, even though it may be in glass bottles in five-gallon lots, is subject to the sun's rays or change in temperature, which is bound to affect the consistency of the gasolene.

It would be well for garagemen to see that their gas supply is secured direct from underground tanks, delivered to the car by suction rather than by air pressure, as air pressure is bound to force air bubbles through the gasolene, thereby taking the vapor, the very life of the liquid, from it.

## Small Number of Machines in Japan Attributed to Poor Roads.

There are 4,000 automobiles in Japan according to Y. Bryan Yamashita, business man and banker of that country now here on business. The population is 45,000,000 and the small number of machines is attributed to the fact that the country has no good roads.



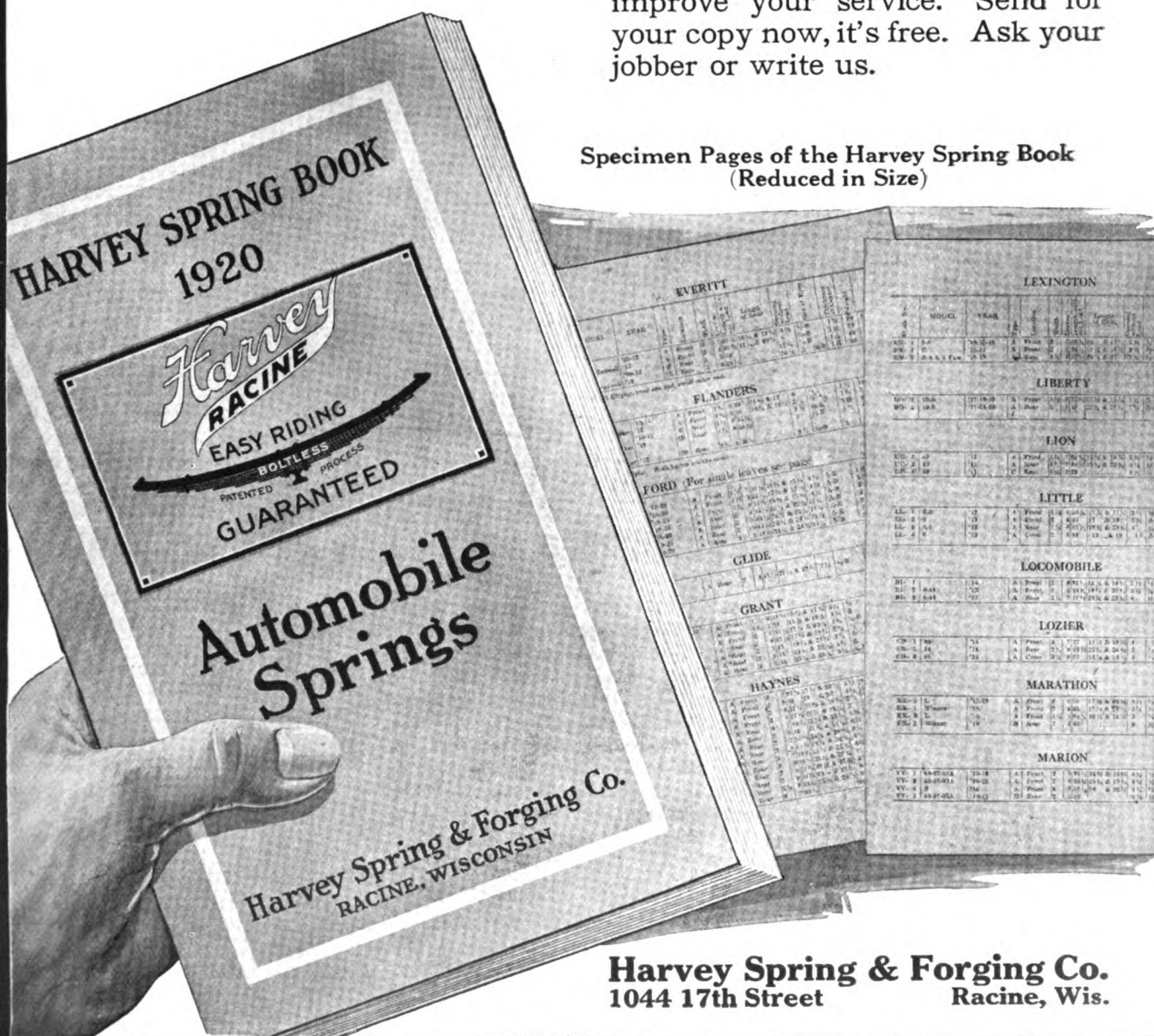
# Every Dealer Wants the New 1920 Harvey Spring Book

A handy reference book containing specifications and complete data for 1500 different automobile springs including old and new models, both pleasure cars and trucks.

Every detail is accurately figured out for your assistance. When you order Springs the Harvey Spring Book helps you to specify correctly, it gives you the information you need when you need it and removes all chances for mistakes and delay.

Use the Harvey Spring Book to increase your sale of springs and improve your service. Send for your copy now, it's free. Ask your jobber or write us.

Specimen Pages of the Harvey Spring Book  
(Reduced in Size)



**Harvey Spring & Forging Co.**  
1044 17th Street  
Racine, Wis.

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Facts and Ideas for the Tire Dealer

## Use of Pneumatics Creates Need for Repair Methods.

The steadily increasing use of the pneumatic-tired truck has created a need for adequate repair methods and tire men predict that in a short time the tire shop that is not equipped to handle this kind of work will be the exception.

Equipment for work on the big sizes of tires has not been available in large quantities, but the tire companies and equipment manufacturers have been working hand in hand and assurance is given that a general demand for equipment can soon be supplied.

From the experiments recently made by Firestone engineers, the methods to be used on pneumatic repairs will in no way be a radical departure from those used in making repairs on the smaller sizes of cord tires. For sectional repairs two general methods are considered practical.

Where the tread is only slightly damaged and the fabric not badly separated, an inside cord patch and an outside tread patch will be found effective.

For large, sectional repairs, the outside should be built up in a manner similar to that used in building up a section of a smaller cord tire and the repair should be reinforced by an inside cord patch. If the tread is in good condition, it may be laid back while the section is being rebuilt. If not, it should be replaced by a section of semi-cured tread band.

For retreads, use of the semi-cured, non-skid retread band is recommended and the raised cure has been found to be effective.

Either sectional or dry cure molds may be utilized in vulcanizing the repair. The cure, in most cases, must be of longer duration than it is in repairing the smaller-sized tires, the time depending largely on the size and nature of the repair.

## Service Should Be Important Item in Tire Sale.

The average driver of a car today sees that his car gets a certain amount of service from the garageman or the dealer, but pays little attention to his tires. Not many persons really know how to take care of their tires, nor how to get the maximum amount of mileage out of them.

The garageman and the dealer are in a position to take care of the car and to look after it so as to see that the driver is not only "sold" but remains sold. How many tire dealers see that the tire buyer gets the same amount of service.

The big end of tire service is not so much to take care of a man's tires, but to

give such advice and information as will enable him to take care of his tires himself and eliminate the cause of his tires going out of service prematurely.

## The Design of Truck Determines the Type of Tire.

Considerable modification is noted in the propaganda which is being spread nationwide urging substitution of pneumatic



This Photograph Shows How One Canadian Tire Dealer Utilizes His Delivery Truck for the Purposes of Advertising His Products —It Costs a Little More for the Special Body, but the Amount of Business He Gets From Such Advertising Pays for the Extra Cost Many Times During the Life of the Car.

tires for solid tires on trucks. Where conditions are favorable to them, pneumatics undoubtedly have the "edge," but tire makers are waking up to the fact that a great percentage of the motor trucks now in use throughout the country have been designed, engineered, and built with the specific use of solid tires in view.

They are advising truck owners to make investigations before they decide on the switch from solids to pneumatics.

## Great Future for Pneumatics Predicted by Goodyear Officials.

That solid tires for motor trucks will be obsolete within three years, street cars will soon be replaced by motor busses and freight cars superseded by motor trucks for long hauls, were the predictions made

by F. A. Seiberling, president of the Goodyear Tire & Rubber Co., at a recent banquet given to the Detroit and Cleveland sections of the Society of Automotive Engineers.

More than 200 of the foremost designers heard Mr. Seiberling's prophecy that within the lifetime of those present, the United States would be criss-crossed by great highways of solid foundation to withstand any wear, and that highways of less than 18 feet in width would be unknown. He asserted that the ultimate tire would be the cord—that there would be no fabric or solid tires.

China was advocated as the future big market for tires as the numerous post roads of stone would be excellent foundations for modern highways.

Mr. Litchfield, factory manager of the Goodyear company, declared that the trolley must go, stating that it has reached a point where it cannot compete with the motor bus. For financial reasons extensions are impossible, so the street car must give way to the gas-driven vehicle which can aid development of suburbs without heavy investment in franchises and equipment.

## Telephone Used for Boosting Sale of Tire Tubes.

Few would think of the telephone as a means of selling tubes for automobiles, but H. H. Hoff, manager of the Duluth branch of the Goodyear Tire & Rubber Co., employs this scheme.

Whenever a pneumatic-equipped truck with tires under-inflated passes his office, he calls the owner by telephone, and warns him of the consequences. The owner is always pleased to get the information, and the good will brought about by the telephone call usually leads to future purchases.

## A Substitute for Pneumatic Automobile Tires Invented in Norway.

A retired Norwegian army officer, Lieut. Col. Fridtjof Andersen, has just perfected an invention which he claims will serve as a substitute for pneumatic tires now used on motor vehicles.

The invention involves the use of steel springs tangentially applied to the wheels, with an outer rim of solid rubber, steel, wood, or other material. The inventor claims that spring wheels, manufactured according to his designs, may be used on street cars and railway trains, as well as on lighter vehicles. No arrangements have yet been made for the manufacture of these wheels.

# Oro

**GOOD as GOLD**

## —the Good Connecting Rod!



**Made of  
the very finest  
steel—drop forged!**

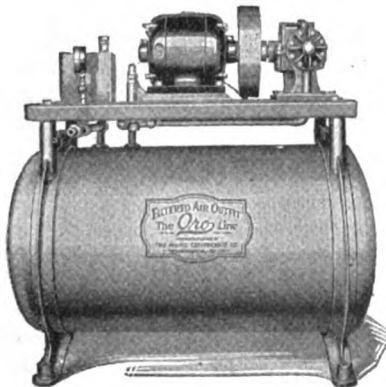
**A** CONNECTING Rod for Ford Cars that is made as you wish it made—sturdy, reliable, long-lived. This rod will stand up as long as the car—eliminating all necessity for tinkering with the “underneath” part of the engine. The steel used is 30 to 40 point carbon, perfect in quality and drop forged. The bab-bitt is a scientific combination which gives unusual satisfaction.

This Connecting Rod, although much better than other rods, costs less than most of the others. It is economical to buy—economical to use.

The ORO Connecting Rods have been in use for many years—under all conditions—and they have proved every claim we make for them. Dealers prefer them—owners demand them. They realize the connecting rod is such an important part of an engine that only the very best quality will do.

*Write us for information. We'll tell you about the ORO Connecting Rods—and also about our large line of superior automobile accessories.*

## **We Also Manufacture “Oro” Filtered Air Outfits!**



The ORO Filtered Air Compressor Outfit provides a perfect source of air—day and night—without attention from you—air that is absolutely free of oil, dust and dirt. It's a business builder—a business holder. We manufacture Au-To Air Compressors for all garages, large and small. Ask for facts about the entire line.

## **The Au-To Compressor Company**

**304 S. Mulberry Street**

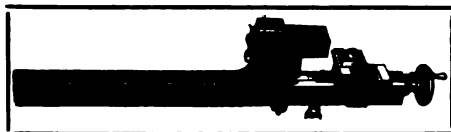
**Wilmington, Ohio**

# Garage Equipment for Better Efficiency

## High Grade Precision Tool for Truing Crankshafts.

A recently invented, ingenious tool for performing work on engine crankshafts is the Weber crank-pin re-turning tool produced by the Sawyer-Weber Tool Mfg. Co.

This re-turning tool works on any ordi-



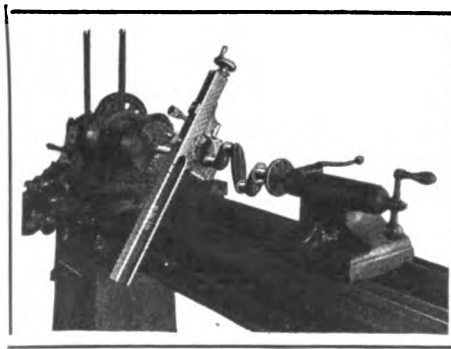
The Weber Crank-Pin Re-turning Tool.

nary lathe. At the top is a hand wheel which feeds the cutters into the pin. This wheel has a dial below that is graduated into thousandths of an inch. The dial can be locked, by means of set screws, in any position, thus making it easy to turn all pins to exactly the same size.

The pin is held firmly in place independent of the cutter by three supports. One of these supports is a bronze shoe that can be adjusted while the tool is cutting. It starts cutting on the least worn surface and gives an absolutely round pin, at the same time removing the least possible amount of metal. There is no filing, no offsetting, and no jigs. The tool is guaranteed by the manufacturer to work within as close limits of accuracy as any other known method.

On account of the enormous expense for tools, crankshaft work has been neglected in the average repair shop. The Weber tool is said to handle this work quickly and cheaply.

Further information can be had from the Sawyer-Weber Tool Mfg. Co., 350



The Re-turning Tool in Operation.

South Alameda St., Los Angeles, Cal. Mention the American Garage & Auto Dealer when you write for particulars.

## Flexlume Signs Embody Durability and Attractiveness.

There may be doubts as to whether certain kinds of advertising produce results

owing to the large percentage of waste circularization, but it is generally conceded that electrical advertising, especially in the automobile and garage business, brings the desired results.

An electric sign is seen by everyone passing the building—it can be operated at very low cost—and the name and location of the owner is brought forcefully to the attention of thousands of people.

The Flexlume Sign Co. claims to have combined the two requisites of quality and minimum price in its Oplex signs, which consist of raised letters of snow-white glass standing out from a dark background. The outline and design of the sign depend upon the buyer's wishes. Of course the company maintains a large and efficient designing department to take care of this service.

Oplex signs are said to personify refinement and good taste combined with excessive brilliance of illumination. At night each character stands out of the darkness a solid letter of light. In addition to being illuminated night signs, they are good day signs. This is made possible because of the raised snow-white letters standing out from their dark background.

A little booklet called "Twenty-Four Hours a Day" has been prepared by the manufacturer and will be sent to any reader upon request. Write to the Flexlume Sign Co., 1439-1446 Niagara St., Buffalo, N. Y., for this piece of literature, and mention the American Garage & Auto Dealer.

## Proper Rivets of Brass and Copper for Use on Brake Lining.

All rivets for use on brake lining should be strong enough to pull the head 1-32-inch below the surface of the lining without breaking, says the Raybestos Co. They should, the company further states, be of copper or brass, that they may not score the drum if they ever come in contact with it.

The head of the rivet should have no wedging or splitting effect when set in the lining. Countersinking of lining is recommended. The flat-headed rivet sunk 1-32-inch below the surface of the lining works well and holds the lining until worn to a depth of 3-32-inch, as it has a tapered head 1-16-inch thick.

The flat-headed rivet is said to have the advantage of actually holding the lining without splitting. The wedge-head rivet, the company claims, should be discarded as it fails to do its work, that of holding the lining to the band. Rivets should not be applied closer than 1/2-inch from the edge of the band and not closer than 3/8-inch from the ends.

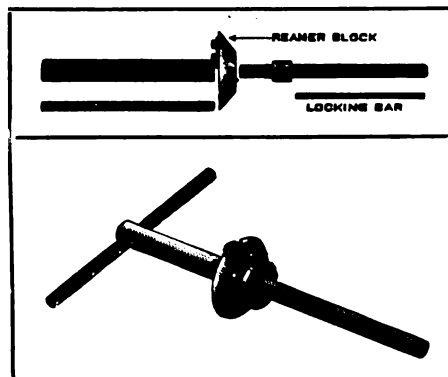
As dealers and garagemen in some towns have difficulty in obtaining some sizes and kinds of rivets, the company has put up in convenient half-pound boxes those most commonly used.

Trade prices and more complete details can be obtained by writing to the Raybestos Co., Bridgeport, Conn. Mention the American Garage & Auto Dealer when you are writing.

## Safety Seat Reamers Made by the A. C. Savidge Co.

The valve seat reamers manufactured by the A. C. Savidge Co., are constructed on the plane principle. That is, the reamer block is equipped with a high-speed, steel cutter which the maker claims will do perfect work indefinitely. This cutter is removable and may be resharpened on an oil stone and readjusted by means of an adjusting screw.

The reamer blocks, the maker states, are hardened and accurately ground, the cutters are set in proper position and the tool is thoroughly tested before leaving the



The Savidge Valve Seat Reamer and Block.

factory. Guide stems are interchangeable and shoulder on the ground surface of the reamer block insuring accuracy.

With each stem or set of reamers is furnished a locking bar to quickly attach and detach the guide stem from the handle without the use of pliers.

This valve seat reamer is guaranteed by the manufacturer to do a perfect job, as the high-speed steel cutter will miss the low spots, taking off the least material possible until the seat is perfectly formed.

Savidge valve tools are said to eliminate practically all of the usual valve grinding, a big item in the present cost of labor.

This is a very practical tool and all garagemen and repairmen should write to A. C. Savidge Co., 611 North Capitol Ave., Indianapolis, Ind., for trade prices and descriptive literature. Mention the American Garage & Auto Dealer when you write.



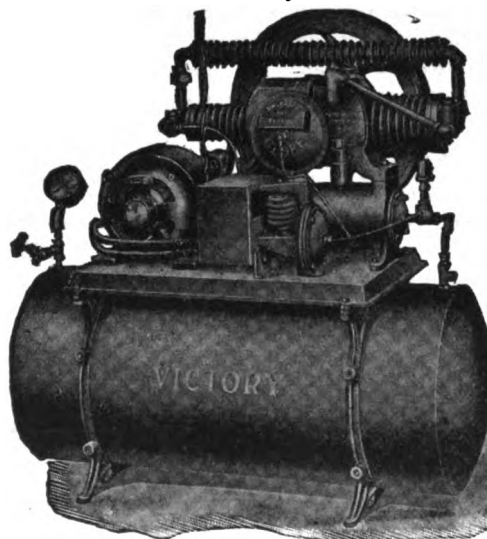


# The Spring Rush is Rapidly Approaching



ARE you facing the busy season with an inadequate or antiquated air equipment? If you are anticipating a really big year it will be well worth your while to have a first-class modern free air outfit.

Your air service is your first point of contact with the motorists of your locality. If the service is prompt and dependable, a favorable impression is made. Accordingly an air service of the right sort is a big factor in attracting business.



"VICTORY" Complete Automatic  
Motor Drive Unit

THE COMPLETE AUTOMATIC COMPRESSOR UNIT shown on this page is a GLOBE TYPE B, the original TWO-STAGE garage Compressor. There have appeared numerous deceptive imitations, but never an equal.

Globe Air Compressors meet the most exacting requirements of garage service, including inflating of the LARGEST PNEUMATIC Truck Tires, for which they provide ample pressure and capacity.

Low operating cost, dependable service and great durability have always characterized Globe Compressors.

Write Department A-G for bulletins

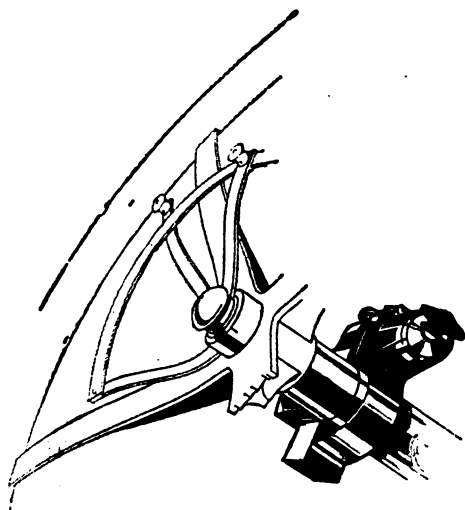
# GLOBE MFG. CO.

BATTLE CREEK MICHIGAN, U. S. A.

# Accessories For Automotive Trade

## A New "Theftproof" Motor Vehicle Locking Device.

The unhappy thought, "I wonder if my car is where I left it?" can be eliminated altogether by the employment of the Theft



The New Theft-Proof Auto Lock.

Proof Auto Lock, says the Hershey Mfg. Co. of its new product.

Neat and sightly in its appearance, the Theftproof Auto Lock consists primarily of a small nickel-plated ring, light in weight and attractively finished—an ornament to any car. It has a Corbin cylinder lock of the five tumbler or pin type, with which an indefinite number of combinations are possible so that no two sets of keys are alike.

By simply snapping a lever and turning the key this theft lock is operated. It is not necessary to have the steering wheel in one definite position as the lock is self-adjusting. When the car is tampered with, as soon as the wheels are turned to the straight ahead position, the lock snaps, engaging the steering wheel rigidly. The car cannot then be driven or towed, or coasted down hill.

Dealers should write to the Hershey Mfg. Co., Equitable Bldg., Denver, Colo., for full particulars and trade prices. Mention the American Garage & Auto Dealer when you write.

## Shaler Roadlighter Shows Efficiency in Official Tests.

Four states, California, Connecticut, New York and Pennsylvania, have adopted the standard A. A. A. anti-glare law which will no doubt become universal in the near future. The law requires light that is safe to drive behind and to meet.

Each state tested practically all lenses to find out what candle power bulbs could be used without glaring. The Shaler lens,

as a recent test sheet issued by the company shows, passed highest every time.

With any lens, the greater the candle power of the bulb, the better the driving light. Lenses using less than the maximum candle power or having the headlamps tipped down, or both, cannot give, it is claimed, as good driving light as lenses which are allowed to use maximum candle power without tipping headlamps down.

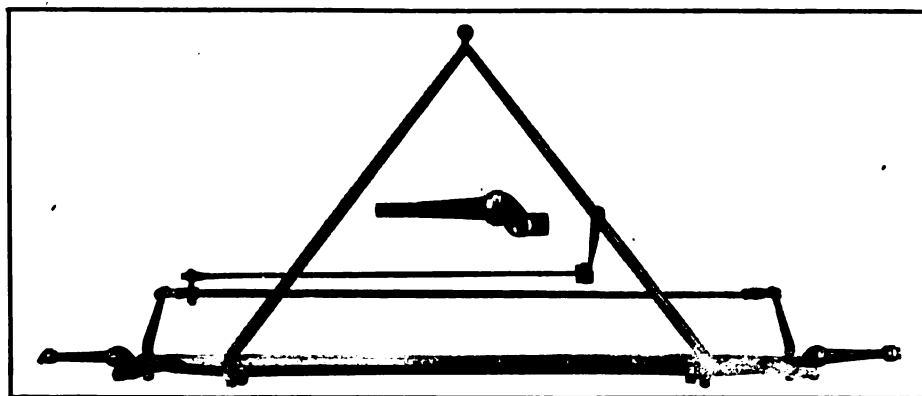
The test showed that the Shaler lens or Roadlighter, as it is called, could use the maximum 92 candle power in California and Pennsylvania and 24 candle power (maximum) in New York and Connecticut. No tipping of the lens was necessary.

Write to the C. A. Shaler Co., 372 Fourth St., Waupun, Wis., for complete details and literature. Mention the American Garage & Auto Dealer when you write.

## Caster Trailing Spindle Makes Ford Easy to Steer.

"Our new caster trailing spindle for the Ford car is based on an entirely new principle," says the Motor Spindle Corp. "This spindle makes the Ford the safest car to drive, bar none. It eliminates the necessity of holding tight to the steering wheel, saves labor, makes it practically impossible for the car to turn turtle, and if the steering gear brakes, the car will go straight ahead.

It saves tires, makes it possible to turn in considerably less space at a good speed without danger of overturning, and makes the car steer in sand, mud or on a rough



Caster Trailing Spindle Which Makes Ford Safest Car to Drive.

road without added labor. It makes the Ford car an easy car to steer."

Send to the Motor Spindle Corp., 214 E. Jefferson Ave., Detroit, Mich., for more definite details, and don't forget to mention the American Garage & Auto Dealer.

## The Kantkumoff, a Rubber Patch for Automobile Tubes.

The Kantkumoff patch, constructed to make permanent repairs on automobile tubes and other rubber goods without vulcanizing, eliminates the danger of over-



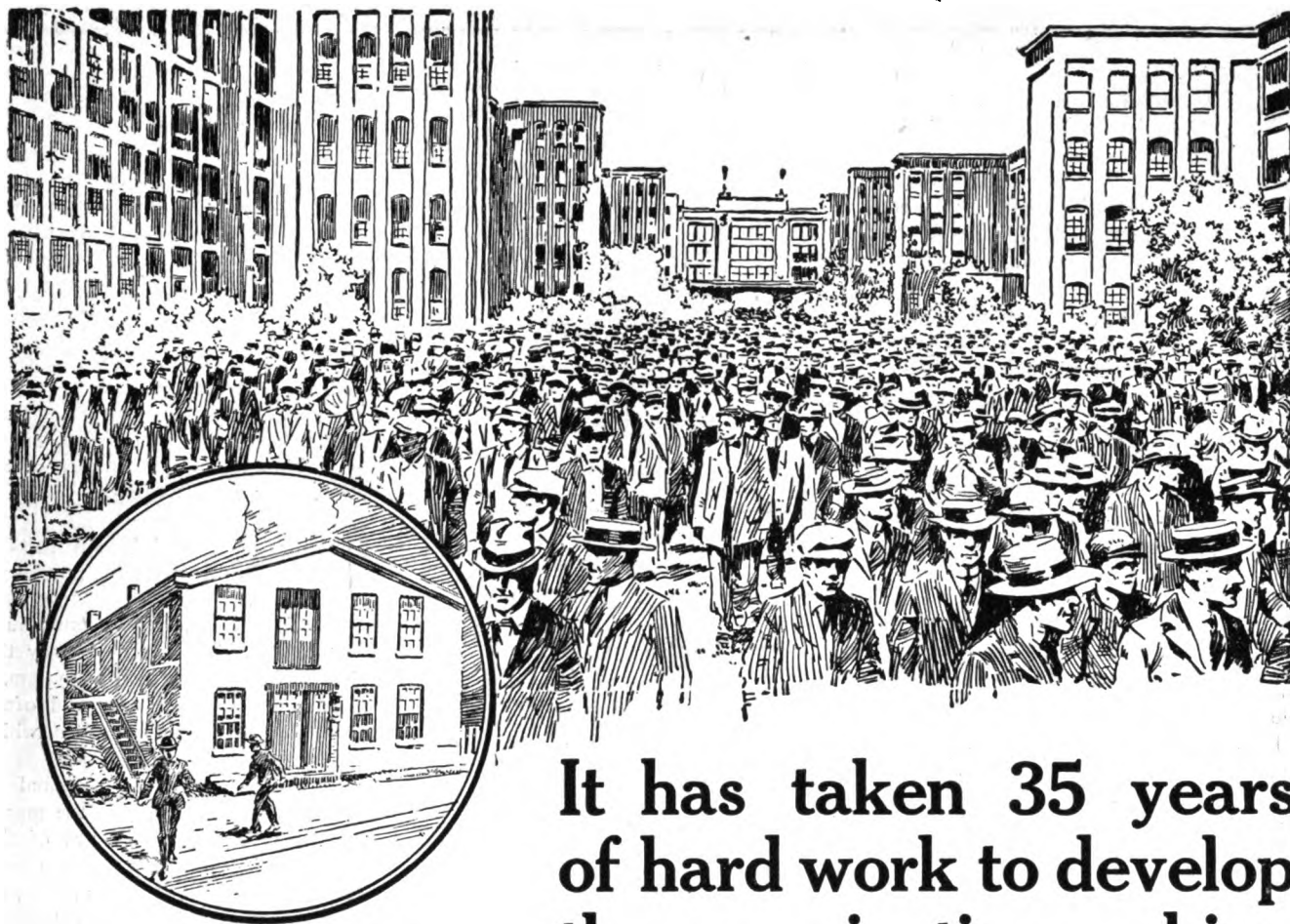
The Kantkumoff Patch for Tube Repairs.

curing, which ruins all rubber goods, says the Stearns Rubber Products Co.

This patch consists of a strong, cured rubber backing, and a pure para-rubber friction, calendered to the backing in such a way that it is almost impossible for the two to part. The gummed surface is protected by a high grade of Holland linen.

The cement used with this patch is of a high grade of pure para-rubber.

A valuable feature is that this patch can be used for either vulcanizing or cold patching. Comparative tests are said to show that this patch has greater strength



## It has taken 35 years of hard work to develop the organization making National Cash Registers

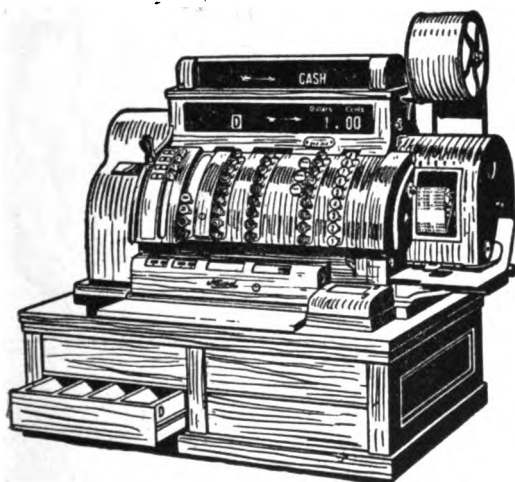
**S**TARTING with two employees in one little room, The National Cash Register Company now has a making organization of over 7,000 people working in 21 big buildings.

It has taken 35 years to develop this tremendous organization.

Many obstacles had to be overcome in those years. Money, time, and energy were thrown into the enterprise by large-visioned men who believed that cash registers were a necessity in stores of all kinds.

Slowly, but surely the business grew. Building after building sprang up to house the expanding organization.

The National Cash Register factory of today is the result. It is built on a foundation of faith in the cash register as a business necessity. It is dedicated to the making of a labor-saving machine that helps merchants, clerks, and customers.



The National Cash Register Company  
Dayton, Ohio  
Offices in all the principal cities of the world

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

and adhesion than any fabric patch made. Manufacturers guarantee it against deterioration for one year.

The company gives the following reasons for the great success of the Kant-kumoff patch: It is an all rubber patch; stretches with the tube; has greater strength; better adhesive qualities; is not affected by temperature; not affected by moisture; it will permanently repair all rubber goods.

Write to the Stearns Rubber Products Co., 358 West Madison St., Chicago, for trade prices and full particulars, mentioning the American Garage & Auto Dealer.

### The Pennypacker Top Converter for Ford Recently Marketed.

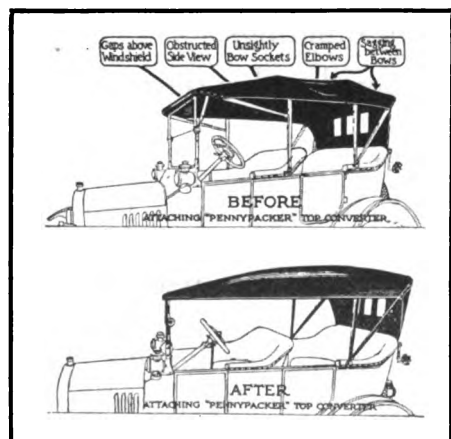
Every Ford owner should know about the new Pennypacker top converter recently put on the market by the Pennypacker Mfg. Co. of Chicago.

It is by far the greatest improvement yet seen for modernizing and giving the Ford car the same fine detail of finished appearance found in the more expensively equipped cars.

Eliminating the unsightly front bows and tension straps that obstruct the vision, hinder passage through the front doors and interfere with the freedom of the elbows, the Pennypacker top converter turns the standard Ford top into a snappy and classy streamline "one man" top, easily put up or down by one man from the inside of the car.

Utilizing the cover material of the old top, it stretches the fabric neatly and snugly over the framework and closes the gap between the windshield and the top, eliminating the sag and wrinkles that mar the appearance of the entire car.

It may be readily installed by any car



How the Pennypacker Top Converter Improves the Appearance of the Ford.

owner with an ordinary hack saw and screw driver.

Dealers: For further information and trade discounts, write the Pennypacker Mfg. Co., 1003 Michigan Ave., Chicago. Mention the American Garage & Auto Dealer when you write.

### Several Innovations in Ford Automotive Equipment.

The Apco Mfg. Co. is said to be the largest exclusive manufacturer of equipment for Ford cars in the world, and it is just announcing some new specialties that



Unbreakable Metal Oil Gage.



The Apco Combination Muffler and Cutout. will be of interest to the readers of the American Garage & Auto Dealer.

All Ford cars have trouble with mufflers exploding. A combination muffler and cutout, made from a one-piece casting with a test valve, is designed to eliminate this difficulty and provides for testing the engine.

A metal oil gage is another innovation along these lines as it is unbreakable, easily installed and the height of the oil can be determined even at night.

The Ford car is not equipped with a device to steady the steering column, and the company has, therefore, produced a steering column brace which will accomplish this result and make the column as rigid as that on the high-priced cars.

The margin of profit on Apco goods is exceptionally large and the large advertising campaign now being conducted by this company means quick sales to the four million Ford owners in this country.

A copy of its complete catalog will be sent to any dealer on request. Write to the Apco Mfg. Co., Providence, R. I. Mention the American Garage & Auto Dealer.

### Aluminite Pistons for Smoothness, Power, and Speed.

Probably no single unit in the entire make-up of a motor car has received so much comment in motor circles as the aluminum alloy piston. "It gives motor results that outshadow the iron piston to a degree that is little short of marvellous," says the Green Engineering Co., manufacturer of the aluminite pistons.

The greater the speed of a piston, the

greater the power necessary to start and stop it in its every stroke—also the greater the vibration and the greater the wear on the bearings.

An aluminum piston weighs about  $\frac{1}{2}$  as much as the conventional iron piston and it is claimed that as a result of this decrease in piston weight, the vibration is taken out and the motor is given a smoothness that makes a "four" equipped with aluminite pistons more than the equal of any ordinary "six." It makes a motor more powerful.

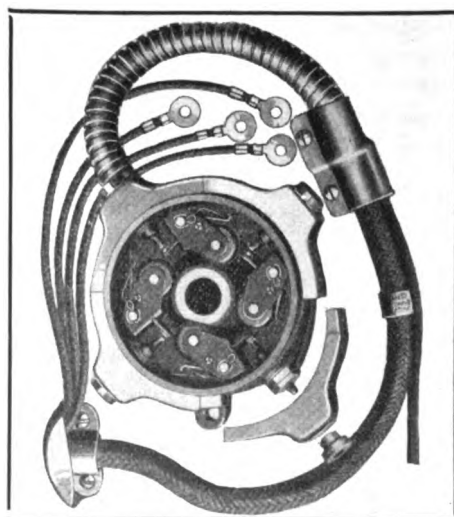
These pistons are made for all makes of motors. Dealers should write the Green Engineering Co., 34 South St. Claire St., Dayton, Ohio, for trade prices and literature. Mention the American Garage & Auto Dealer when writing.

### Duntley Wire and Terminal Guard Cure for Ignition Troubles.

Ford owners need no longer be bothered with broken wires, loose connections, and short circuits that utterly destroy the efficiency of the entire ignition system, causing unnecessary annoyance and often resulting in more serious troubles, which incur large repair bills.

The Duntley wire and terminal guard, which has just been put on the market by J. W. Duntley, manufacturers of the famous Duntley magneto break timer, entirely eliminates the trouble makers, carries the exposed wires in a flexible metal conduit, and covers the timer and terminals with dust-proof metal guard; it is claimed to afford absolute protection to the most vital part of the entire ignition.

The new Duntley wire and terminal guard readily fits the Duntley magneto



The Duntley Wire and Terminal Guard.

break or standard pattern Ford or Fordson Timer and may be installed in a few moments' time.

For further information and trade discounts, write J. W. Duntley, 1011 Michigan Ave., Chicago, Ill. Mention the American Garage & Auto Dealer.



## THE ROSE TIRE PUMP

*is the Tire Pump  
Equal to the Task*

The big truck tires are becoming more numerous daily. A dependable Tire Pump is the most carefully selected part of the equipments, that's why 98% of the Truck owners are partial to the ROSE TIRE PUMP.

**Over 2,000,000 ROSE TIRE PUMPS**

in use today and but 44 replacements in 1919. The patent valve is responsible for the ROSE being the easiest pump to operate.

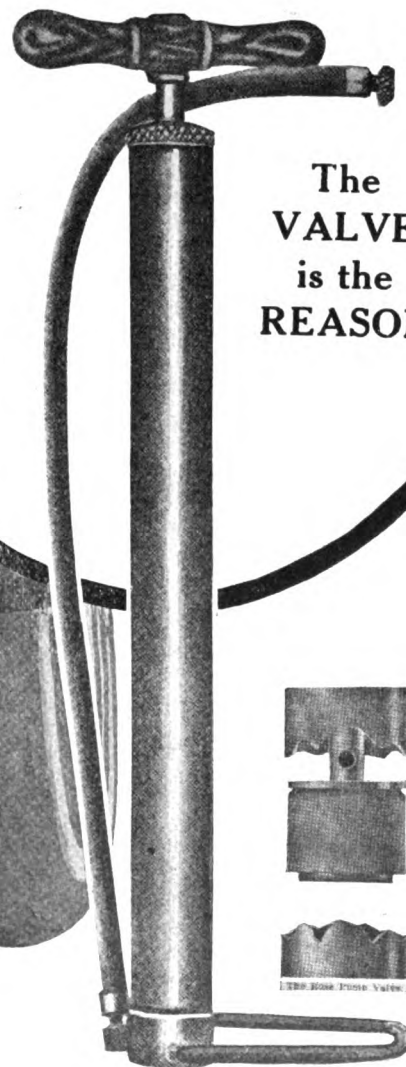
ALL DEALERS AND JOBBERS

TWO SIZES {  $1\frac{1}{4}$ " all steel construction ... \$3.00  
                  {  $1\frac{1}{2}$ " all steel construction ... 3.50

Manufactured by

**Frank Rose Manufacturing Co.**  
HASTINGS, NEBRASKA

The  
VALVE  
is the  
REASON



Give the AMERICAN GARAGE AND AUTO DEALER Credit With Writing Advertisers.

# News of Manufacturers and Jobbers

## Circulars Describing Products Issued by Parts Service Co.

The Parts Service Co., organized by O. J. Hinger, now president and general manager, has sent out circulars which thorough-



O. J. Hinger, Organizer and President of the Parts Service Co.

ly explain the various parts for all makes of cars, trucks, and tractors which the company is in a position to furnish to garagemen and service stations.

The company carries a large stock of valves, spring bolts, king bolts, etc., manufactured to standard dimensions.

All garagemen and repairmen should write to the Parts Service Co., 5105 Euclid Ave., Cleveland, Ohio, for these circulars and trade prices. Mention the American Garage & Auto Dealer when you write.

## Kansas City Oil Firm Told to Quit Unfair Practices.

The Federal Trade Commission has ruled that the Penn Lubric Oil Co., trading as Midwest Linseed Oil & Paint Co., Kansas City, Kan., refrain from certain unfair methods of competition in the manufacture and sale of oils, greases and kindred products.

The commission's ruling is on the following practices: (1) Falsely representing by letterheads, advertisements, etc., office or factory or equipment or place of business; (2) selling linseed oil which has been mixed with low grade mineral oil and other ingredients as "commercial raw linseed oil not sold or intended for medicinal purposes," without indicating to the purchaser that it is adulterated; (3) selling or adver-

tising for sale linseed oil when the product so sold or advertised has been adulterated with baser mineral oil, chemicals or other ingredients, unless it is clearly and distinctly shown to the purchaser the true character of the product offered; (4) selling or offering to sell in any manner, paints, oils, greases, etc., which have been adulterated or which contain adulterated ingredients, as and for pure products.

## United States Air Compressor Co. Moves to New Plant.

With the increasing demand for tires for pleasure cars and trucks comes news of the removal of the United States Air Compressor Co., of Cleveland, Ohio, to its new factory on Harvard Ave., in that city.

The necessity for compressors of greater tank capacity and compressing ability, and particularly for the Giant two-stage compressor which has been perfected to efficiently inflate giant truck tires, is said to have caused this company to grow to such an extent that its former quarters and equipment could not handle the orders that came in.

The new plant is equipped throughout with every modern appliance for the rapid production of air compressors. An example of this is the running-in stand, which laps in 30 compressors at one time. Every convenience for the welfare of the employes has been provided. The location of the new plant is said to greatly facilitate shipping and to increase the possibilities for prompt delivery.

The company states that its compressors

## Practical Ford Sales and Service Price Manual.

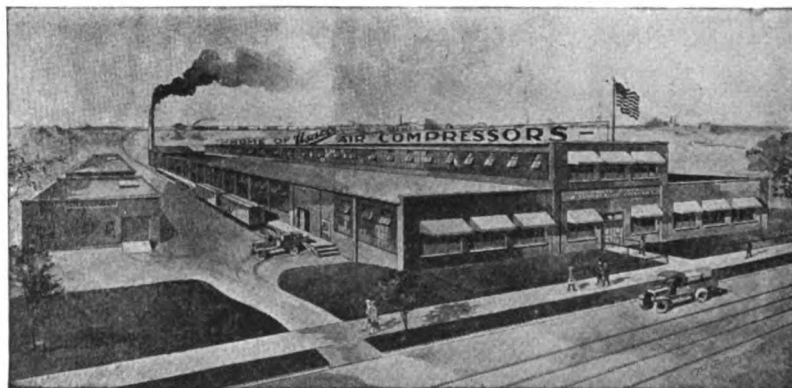
The new Ford Sales and Service Price Manual exclusively distributed by the Fairbanks Co., enables the owner of the service station to give a practical and instantaneous estimate of the cost of definite repairs.

It has been compiled from data collected from the Ford Motor Co., and dealers in all sections of the country operating under widely varied conditions. The information is listed under divisions, such as motor division, rear and front system division, chassis division, etc. Under these division headings, labor charges and time allowed on labor operations on every Ford repair job have been grouped. The manual also contains a section entitled "Facts About Ford Cars," which gives many instructive facts about the "Universal Car."

More detailed information and prices will be sent to those writing the Fairbanks Co., Lafayette & Broome Sts., New York City, mentioning the American Garage & Auto Dealer.

## Spencer Metal Products Co. Offers Parts for Prompt Delivery.

So far no manufacturer with a large plant and ample production resources has ever undertaken the manufacture of axle shafts and replacement parts for distribution through the jobbing trade. Car dealers have had to depend on their car factories for their axles and it has been so difficult to secure deliveries that in most cases they have had no stock and before they could serve a customer have had to enter factory



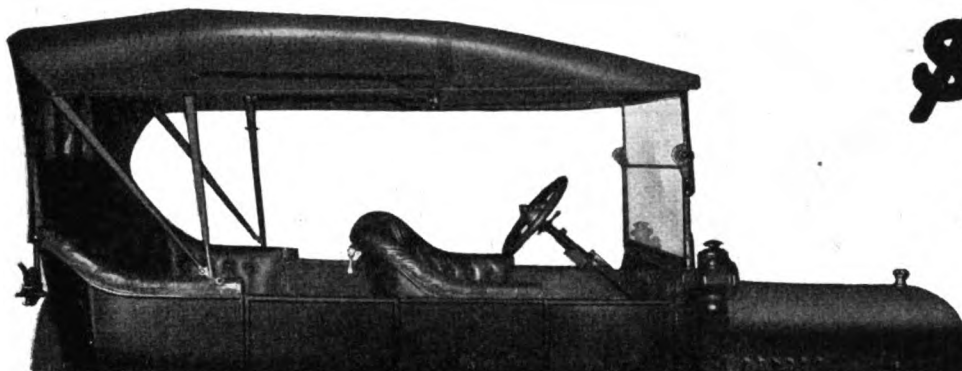
The New Home of the United States Air Compressor Co., Cleveland, Ohio.

have many new and exclusive features, among which is a patented automatic air release and unloading device for alternating current motors, which eliminates the chances of burning out the motor through overloading.

orders with all the attendant delays and inconveniences.

The Spencer Metal Products Co., Spencer, Ohio, is now manufacturing a complete line of axle shafts, drive shafts and replacement parts, for prompt delivery.

# The PENNYPACKER TOP CONVERTER for Ford Cars



**\$7<sup>50</sup>**  
IN U.S. ONLY

PRICE COMPLETE,  
READY TO INSTALL,  
FOR EITHER TOUR-  
ING CAR OR RUN-  
ABOUT.

## The Ultimate Development of a Brilliant Thought

Turns your present top whether new or old into a strictly "one-man" top with all the graceful appearance and convenience of the most expensive car equipment.

It entirely eliminates the unsightly and inconvenient front bows and tension straps, and gives a clear view and unrestricted passage through the front door.

Install it yourself or let your repair or garage man do it at a slight additional cost.

**If your dealer cannot supply you, we will.**

**PENNYPACKER MFG. CO. 1003 Michigan Avenue, Chicago, Ill.**

Meritorious inventions developed, produced and marketed.

# ROMORT AIR STATION MAKES 'EM STOP AT YOUR GARAGE

Acting like a powerful magnet, the new Romort air and water station attracts car owners and drivers from everywhere.

It is by far the most effective advertising that you can buy.

## CLEAN—QUICK—EFFICIENT

It does away entirely with the dirty, grimy and usually broken curbstone air hose and the bothersome old waterbucket.

The hinged air pipe of the Romort automatically returns to a vertical position after using and holds the air hose clear of the ground at all times, preventing breakage by cars running over it and rotting caused by dirt and oil.

The air hose cannot kink or break as there is one continuous hose from the tire valve to the base of the stand.

Built in Two Styles—

No. 11 Curb Air Station. No. 12 Curb Air Station with water. **Write us today for full details.**



Manufacturers  
**The Romort Mfg. Co.**  
Oakfield Wis.

Sales Dept.  
**The Zinke Co.**  
1323 Michigan Ave.  
Chicago, Ill.

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Each part is said to carry an unconditional guarantee.

### New Useful Catalog on Dover Automotive Specialties.

The Dover Stamping & Mfg. Co. is presenting to the trade an extremely attractive and useful catalog of 60 pages describing its products, which include funnels, combination measures and funnels, tourists' oil and gasoline kits, automobile safety drip pans, electric bulb cases, safety waste cans, tire-tube testing tanks, gasoline measures, radiator fillers, gasoline cans and oilers.

Eighty-six years ago, says the foreword, a country tinshop was started in Dover, N. H. (from the town of Dover the company gets its name), by Horace Whitney. The business was carried on, in a small way for a number of years, until in 1857 it became necessary to establish an office in Boston, and the firm name was changed to the Dover Stamping Co. The principal part of the business at this time was the stamping of tin plates (imported from England) into tinware of all kinds. As the business grew, the company began to turn its attention to the manufacture of funnels and measures adapted to automobiles.

Every improvement and innovation in automobile funnels and measures is said to have had their beginning in the Dover company's factory. At present 242 articles designed for automobile use are produced by this company.

The catalog is sure to prove of interest and value to all garagemen. It will be sent to those writing the Dover Stamping & Mfg. Co., 385 Putnam Ave., Cambridge "A," Mass. Mention the American Garage & Auto Dealer when you write for this catalog.

### Unique Offer to Dealers of En-ar-co Motor Oil.

A unique offer to dealers is that made by the National Refining Co. Where a 100-gallon deal of En-ar-co motor oil is sold, a letter will be sent to 50 of the dealers' customers entitling them to receive free the fascinating En-ar-co Auto Game—a game for grown folks and children. Letters will be sent to 25 parties where 25 gallons are sold.

Each game consists of a playing board, size 14½ inches square, which is lithographed in six colors on heavy stock, a spinner with metal dial and four miniature checker automobiles lithographed on cardboard, packed complete in a large envelope with instructions for playing this game.

Every child in the neighborhood will want one of the games—and grown folks like games too, you know, so dealers should take advantage at once of this interesting and unusual offer. Write to the National Refining Co., Cleveland, Ohio, for the new dealer booklet and complete information

concerning its offer. Mention the American Garage & Auto Dealer when you write for this interesting proposition.

### New Organization for Manufacture of Differential and Bevel Gears.

Announcement has just been made of the organization of the Fairfield Manufacturing Co., Lafayette, Ind., to manufacture



The Game Offered to Users of En-ar-co Oil.

differential and bevel gears for automobiles. The officers of the new company, all of whom are prominent in the Ross Gear & Tool Co., makers of the well-known Ross steering gears, are D. L. Ross, president, J. W. DeCou, vice president and general manager, Edward A. Ross, secretary, George C. Kumming, treasurer, and David E. Ross, consulting engineer.

All of the patents, machinery, etc., for making bevel gears, formerly owned and controlled by the Ross Gear & Tool Co., have been taken over by the new organization, which starts its career with promise of great success. The new company will take possession of the plant formerly occupied by the Lafayette Engineering Co. and will soon be in full production. Officers state that they already have enough orders on their books to run to full capacity for an indefinite period.

### Latest Catalog of the Columbia Mfg. Co. Ready for Trade.

A copy of the latest catalog of the Columbia Mfg. Co. covering grinders and buffers, countershafts and presses for heavy hardware, mill supply and the automobile trade, has just been received.

Among the descriptions, which are accompanied by good, clean-cut illustrations, are those of the Crescent grinder No. 4-A, which is complete with guards and rests, well adapted for the variety of miscellaneous grinding to be done in a repair shop; Crescent grinder No. 4 which has an extra long spindle and extra long bearings; the No. 4 disk grinding attachment to be used

on either the No. 4 or No. 4-A grinder and designed for sharpening disks or cutters up to 36 inches in diameter; columns and guards for grinders; and exceptionally strong and durable countershafts.

The Columbia Mfg. Co., Belleville, Ill., will gladly mail copies of the catalog to those writing to it, mentioning the American Garage & Auto Dealer.

### Motor Oil Made in Accordance With Standard Specifications.

Before the war there were no real definite, conclusive data on lubricants. Each producer noted conditions to the best of his knowledge, but the expense and problems involved prohibited private enterprises from procuring conclusive data.

With the result of the war largely dependent upon the performance of airplanes, motor trucks, automobile transports, marine engines, etc., the problem of knowing oil changed from a matter of advantage to a positive necessity. Absolute knowledge was needed and needed quickly. To get it, the government secured the services of the highest authorities. Thousands of formulas were tested. Countless engine tests were run under different circumstances, then the engines were torn down and the oil conditions noted.

From the mass of data gathered, they worked out a formula for oil of the proper viscosity and flash at a cost of nearly half a million dollars. The producers of 88 Motor Oil are following the guidance of the identical specifications established by the government as a standard. As a result, the Motor Oils company claims that 88 Motor Oil has a perfect film, that it stands up under heat and protects cylinder walls and bearings at every temperature; also that it is free of all sediment or sediment-forming compounds and keeps the motor clean and free from carbon.

Write for complete information and trade prices to the Motor Oils, Inc., 56 E. Randolph Street, Chicago. Mention the American Garage & Auto Dealer.

### Stockholders of Durston Gear Corp. Elect New Officers.

At the annual stockholders' meeting of the Durston Gear Corp., Syracuse, N. Y., held February 16, R. M. Bean, sales manager, and A. C. Bryan, factory manager, were elected directors and vice-presidents of the corporation, in recognition of their faithful efforts with the company, both men having been associated with the concern since 1913.

The company is the outgrowth of the Lefever Arms Co., manufacturer of the famous Lefever shotgun. In 1916 it was deemed advisable to sell the gun business, together with the good-will and name, to the Ithaca Gun Works, Ithaca, N. Y. The Lefever Arms Co. then reincorporated under the title of Durston Gear Corp.



## Agents wanted in open territory—

Here is a thoroughly practical and serviceable one man dump body for Ford and other cars. Easily installed on a Ford truck or any other chassis. One man can operate the dump from the driver's seat with one hand.

The dumping mechanism is wonderfully simple. The rear gate opens automatically, opening as the body is tipped up, closing securely when it is lowered.

An especially valuable feature of our special body for Fords is that the top of the body is only 4 ft. 10 in. from the ground. This saves time and labor when loading with shovels. A blacksmith can make any repairs this body will need.

# JENNINGS Automatic Dump Bodies

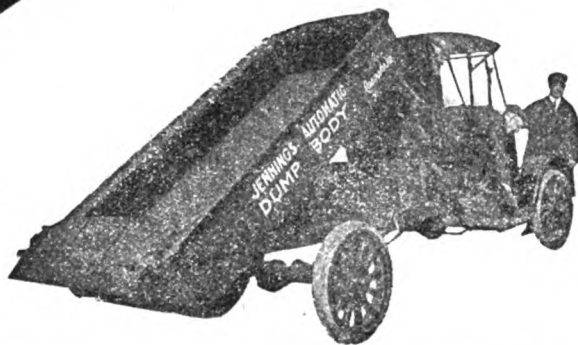
**FORD BODY**  
\$225.00 Complete

Bodies for other trucks, \$225.00 to \$350.00.

F. O. B., Roanoke, Va.

**DEALERS**—There is a big demand in your locality for just such a dump body as the Jennings. Write today for full information.

Jennings Automatic Dump Body, Inc.  
Roanoke, Va.



## Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

**Over 350,000 sets now in use**

Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

**Price \$12.00 per set of four.**

**DEALERS**—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

**P. H. Webber Company**  
HOOPESTON, ILL.

Chicago Sales Office:

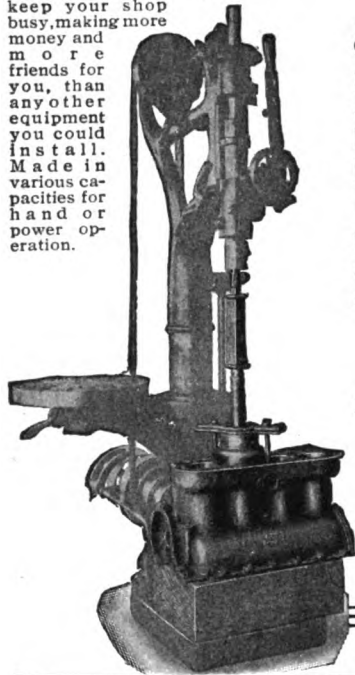
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.  
In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.  
London, Ont., Canada



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Put This MONEY-MAKING EQUIPMENT to Work in Your Garage

**Storm Standard  
Reboring Machines**  
will do more to  
keep your shop  
busy, making more  
money and more  
friends for you,  
than any other  
equipment you  
could install.  
Made in various  
capacities for  
hand or power  
operation.



## It Will Earn Its Cost the First Year

**P**UT your garage on a big-business basis with Storm Tools. You don't need experienced men to operate them. These practical machines will add to the efficiency and output of your shop. They solve the labor shortage problem—more work can be handled in shorter time.

Don't send your reboring jobs to other shops. **You** can handle them yourself with a Storm Cylinder Reboring Machine and double your profits.

Write us for further information

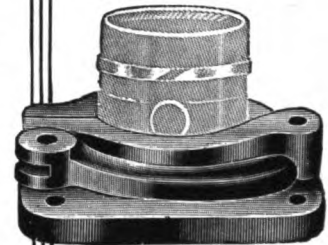
**STORM MFG. CO.**

Dept. E

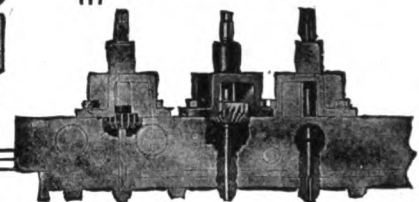
Minneapolis, Minn.

**STORM**  
MOTOR REPAIR EQUIPMENT

The Storm Piston Vise, for 3 1/2-16 to 4 inch pistons, inclusive. Saves time and labor—gives firmer grip without danger of damaging parts. Quick action is insured by eccentric leverage and self-opening jaws.



The Storm Valve Port Renewing Tool renews the valve system completely—removes the old wide, irregular face—enlarges the port—produces new narrow seat and new accurate stem guide.



# You get a good share of the profit.

The **MODEL "N" MARVEL CARBURETER** improves car performance, and increases mileage from 22 to 25 miles per gallon.

No changes are necessary to install it. Fits right in place of regular installation.

# MARVEL CARBURETER

*Designed especially for FORDS*

sold on 30 days' trial, with money back if not satisfactory.

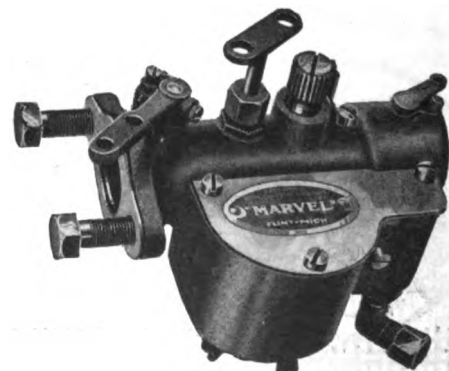
Price F. O. B. Factory \$10.00

**MODEL "E" CARBURETERS** are standard on Buick, Oakland, Nash, Scripps Booth, GMC, Wilson and all 3/4-ton U. S. A. Government Trucks.

**MODEL "E" Carbureters** greatly improve Maxwell, Overland, and Studebaker cars.

*DEALERS--If interested, write for further information*

**MARVEL CARBURETER COMPANY**  
FLINT, MICHIGAN, U. S. A.



# The TIRE FILLER that has made good



## Trouble-proof tires with ample resiliency

is a combination that was long sought by the motoring public. Some tire fillers failed to stand up under long service—most of them lacked the essential resiliency. But these two vital qualities were at last combined in

## NATIONAL RUBBER TIRE FILLER

It has brought joy and satisfaction to tens of thousands of car and truck owners. It has done away with punctures, vulcanizing, patching, tire repairs of all kinds. Users get 10,000 to 20,000 miles out of every tire.

Besides, National Tire Filler has a wonderful resiliency. It takes the place of air, rides as easy, and does away with the inner tube.

National Rubber Filler is made of the best grade of rubber, cut in small particles, treated, moulded and vulcanized by our special process. The result is a compound that is light, strong and resilient. Made in sizes to fit all standard tires. It is laid in the tire and not melted or poured in. Will not harden, freeze, or melt—fully guaranteed against deterioration in any form.

DEALERS—National Rubber Tire Filler sells because it has made good. It combines comfort with economy of tire upkeep. We have a fine proposition for you. Write us today.

**National Rubber Filler Co.**  
210 College St. Midlothian, Tex.

**EVEREADY  
STORAGE BATTERY  
SERVICE STATION**  
Birmingham.

**OPLEX SIGNS**  
**Day and Night Advertising**

**M**ANY of the best known trademarks in the automotive field are proclaimed in the raised, snow-white glass characters of an Oplex Electric Sign.

This is because large advertisers realize the importance of electrical advertising, and naturally they select the raised, snow-white Oplex letters which give them excellent day signs as well as illuminated night signs. No other signs combine this day and night effect.

In addition to being day and night signs, Oplex Signs have greatest reading distance, lowest upkeep cost, most attractive designs. They can be read at any angle and any trademark can be perfectly reproduced in raised Oplex characters.

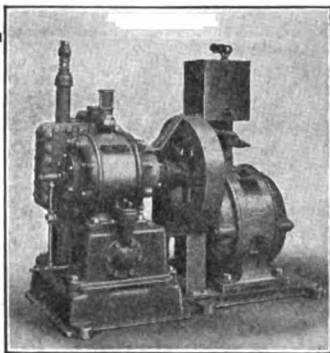
You need an Oplex Sign to tell the story of the cars you handle, the service you give. Let us send you a sketch showing how *your* Oplex Sign will look.

**THE FLEXLUME SIGN CO.** Electrical Advertising  
Niagara St. & Potomac Ave.  
Buffalo, N.Y.

Pacific Coast Distributors  
**Electric Products Corp.**  
Los Angeles, Cal.

Canadian Distributors  
**The Flexlume Sign Co., Ltd.**  
Toronto, Ont.





## Before choosing—investigate Jackson Rotary Compressors

You will find the Jackson to be best for garage service, because it combines light weight and very low cost of upkeep with high all-around efficiency. Other features are—

Slow Speed	No Vibration
Easy to Install	Positive Displacement
No Expensive Foundations	Perfectly Balanced
Quiet Operation	Check Valves on Discharge
No Valves on Intake	Simple to Operate
Only five Moving Parts Running in Oil	
All Bearings Hyatt Roller-High Duty	

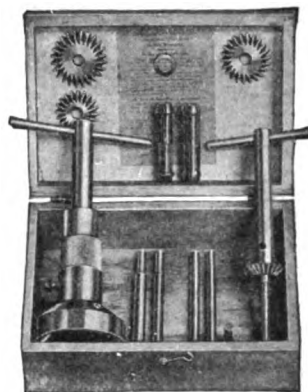
Write for descriptive matter and prices

**JACKSON COMPRESSOR CO.**  
231 S. Cherokee St. Denver, Colo.

## A real friend of the garageman

### FOSNACHT VALVE RESEATER

The oldest valve seater on the market and still the leader. The quickest, most accurate and most dependable of them all. This compact dependable outfit will serve you long and well—and will pay for itself over and over again.



### Other PARO Garage Specialties

EKERN PORTABLE GARAGE GREASE GUNS  
EKERN PORTABLE WORK BENCH  
EKERN MOTOR STAND FOR FORD MOTORS  
EKERN EMERGENCY AXLES and AXLE STUBS

*J. H. Paro Co.*

Ask your jobber or write us for literature on this money-making equipment.

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## You Don't Guess the Answer You READ It on the Blade

Cylinder measurements guaranteed accurate to within .00025" and less.



## The AM-PÉ-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and instantly read the correct measurement.

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PRICE \$2.50

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will pay **\$100**

if they fail to duplicate any part of any make of automobile or truck foreign or domestic, submitted to them. That sum will be paid to the person sending the order.

Parts of any machine can be duplicated in 1 to 3 days' notice. All welding is done at their risk. Do not compare this work or welding with that of others. If you have a broken part or parts that others cannot weld or repair, send them to Pondelick's. They increase the durability of many parts—even where the manufacturers fail.



Supply your customers with "Pondelick's" anti-leak piston rings, and you insure them against engine trouble.

They have the largest and best equipped plants in the United States for the repair or reproduction of automobile parts.

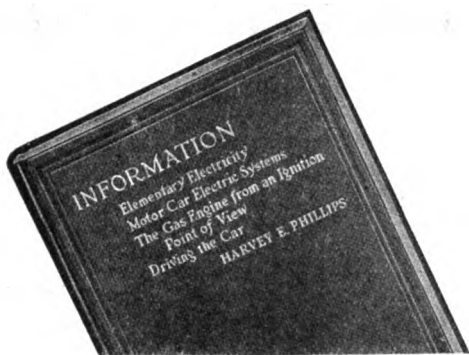
Cylinder regrinding, new piston, special casting, heat treated, Pondelick's self-adjusting, anti-leak piston rings, new wrist pin, hardened and ground, bushing made of genuine bronze, including fitting and assembling of connecting rod to piston for \$15.00.

Reputation, not competition, determines our policies. Visit our plants and be convinced. Ask anywhere or anybody about our work.

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This 500 page book will solve many of your most perplexing problems. It gives the facts that you need to thoroughly understand, the theory of electricity and its application to the operation, care and repair of starting, lighting and ignition systems. Complete in detail and thoroughly practical. Used and recommended by all manufacturers.

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Formerly Phillips Engineering Co. and Auto Electric Systems Co., Dayton, Ohio.

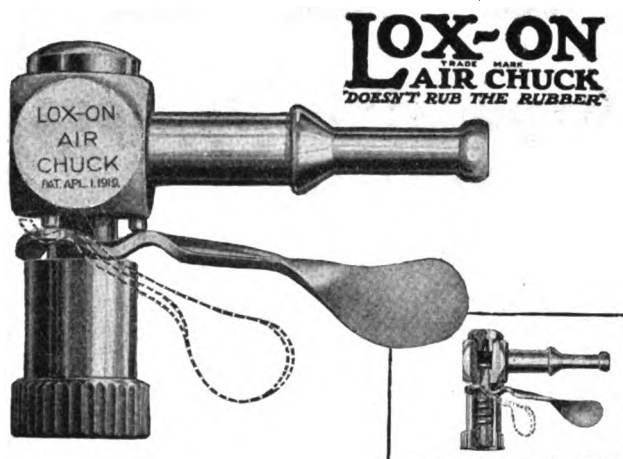


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Kindly hurry that order for Inflating Valves. We had no trouble with our Free Air Station as long as we used this Valve but when we had to put in another make, — the fun began.

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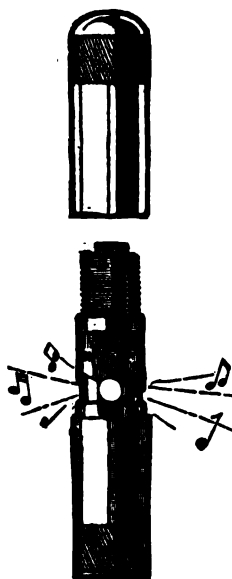


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Backed by strong advertising and merchandising service, these products are making friends and profits all over the country. Write us or ask your jobber.



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"IT WHISTLES WHEN ITS MAD ENOUGH"

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## YOU CAN DO THIS WORK

The Universal Main Bearing Babbiting and Boring Equipment for Ford and Fordson Motors is highly endorsed by 14 out of the 16 Ford dealers in the city of Detroit—"The Home of the FORD."

This is a recommendation of which we are proud.

Garage-Men! Let us help you to build a bigger and better business.

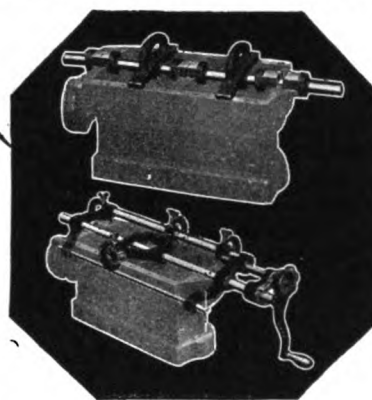
Write for nearest jobber.

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Manufacturers of UTCO Products

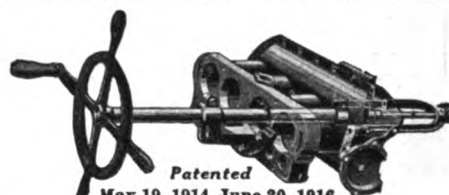
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The Heiser Improved Cylinder Reboring Tool for Ford Motors



Patented  
May 19, 1914 June 20, 1916  
Dec. 15, 1914 June 26, 1917

is the only Reboring Tool in the world that is self sharpening. It is the only Tool except expensive grinders that will not leave the finished cylinder slightly tapered toward the bottom. It is the only Tool that rebore between centers—this insures a finished cylinder, square with the crankshaft, round, straight and true. It is adjustable, and the only Tool that will rebore different sizes without losing the adjustment.

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Write today for full particulars.

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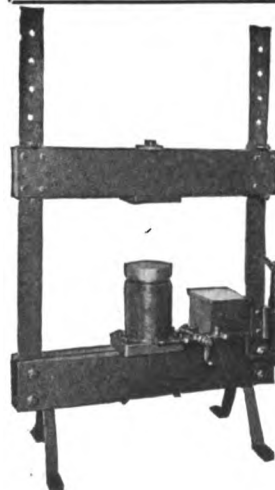
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By three absolute necessities

**FORD Relief Springs, Hub Foot Brakes, Running Board Truss Rods**

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**HYDRAULIC**  
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TYPE Z

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We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

Write today and feel free to consult our Engineering Department.

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Charges batteries at cost of 5 to 15¢

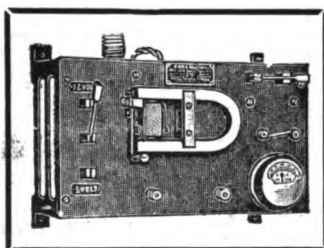
FORE RECTIFIERS are unexcelled for simplicity, efficiency and economy. They are practically automatic, easy to operate and do not injure batteries. They operate by attaching plug to lamp socket.

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Made in five sizes embracing every requirement. Type 2B, illustrated below, has a capacity of 12 volts, and will charge both 6 and 12 volt batteries. This type can be placed in running board and battery charged without removing from car.

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OWENSBORO, KY.



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DETROIT SPECIAL

OVERALLS & COMBINATION SUITS

Where They  
Excel

*The Pig on the Label  
Guarantees Wear, Fit and  
Comfort.*



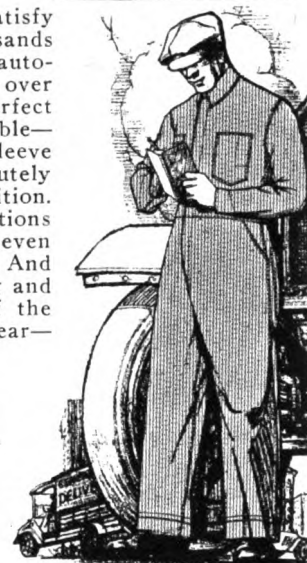
Finck's Combinations will satisfy you as they have satisfied thousands of wearers who work around automobiles. You can wear them over any clothing and they afford perfect protection. They are comfortable—plenty of leg room, plenty of sleeve room, plenty of seat room—absolutely no binding anywhere in any position. That's because Finck's Combinations are cut over big patterns. So even after washing they fit perfectly. And because they fit without binding and are so perfectly constructed of the best grade of material they wear—"Like a Pig's Nose."

Ask your dealer for Finck's Combinations. If he can't supply you write us.

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Detroit, Michigan

Manufacturers of High Grade Overalls, Men's and Women's Combination Work Suits

Branches:  
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SEND THEM TO US

and make them a real source of profit. No matter if they are punctured, rim cut, sand-blistered or blown out—we make them like new.

Our process gives old tires at least 5000 more miles of service. You can readily sell them at a good profit to yourself.

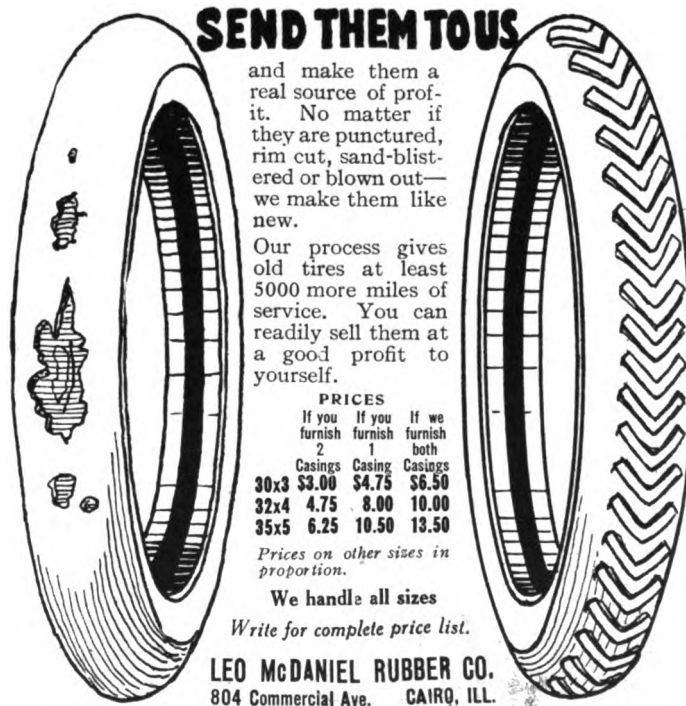
	PRICES		
	If you furnish	If you furnish	If we furnish both
	2	1	Casings
30x3	\$3.00	\$4.75	\$6.50
32x4	4.75	8.00	10.00
35x5	6.25	10.50	13.50

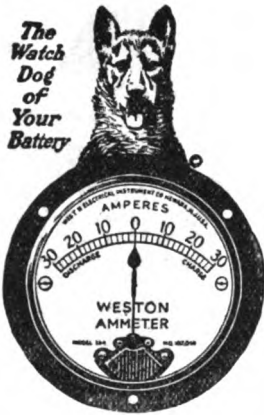
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We handle all sizes

Write for complete price list.

**LEO McDANIEL RUBBER CO.**  
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Public approval is the soundest possible basis upon which to build your business. For upward of thirty years we have been pre-eminent throughout the world in the manufacture of Electrical Measuring Instruments. Today, the

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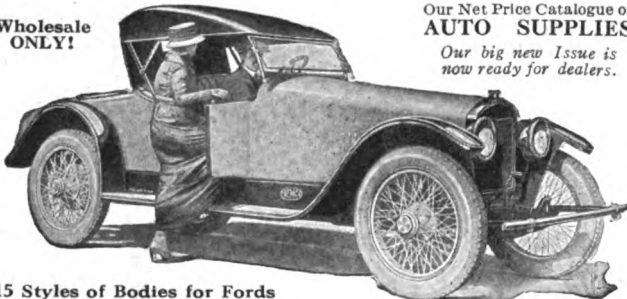
Model 354  
**AMMETER**

which is advertised in the National magazines with circulations reaching into the millions, is used on a very large percentage of the highest grade domestic and foreign cars. A Weston Ammeter will increase your reputation and your business. It is the only absolutely reliable safeguard for the battery. There is a good profit for you. Write us.

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See us at the New York Show, Grand Central Palace, Space D-200.

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Wholesale  
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15 Styles of Bodies for Fords

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Our big new Issue is  
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Make Money Equipping old FORDS with these classy, \$35 AND  
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**NEW ENGLAND MILLS CO., 1027 W. VanBuren St., Chicago**

## HOORAY FOR THE VANDERPOOL

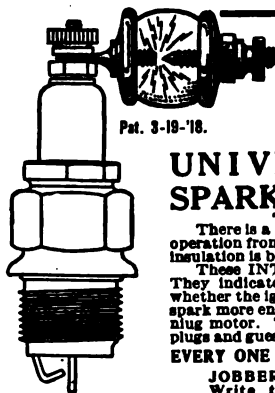


That is what all Vanderpool users say, they will tell you the Vanderpool is compact, takes up little space, so scientifically arranged that you can turn out a great amount of work in a short time. Ask any Vanderpool user.

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No wonder they are enthusiastic; you will be too after you are started, many of our most successful men began without any knowledge of Tire-Rebuilding, but with the Vanderpool method of free Home-study, they became proficient in a short time. You can learn in a few weeks of your spare time without interfering with your regular duties. Vanderpool equipment will fit you out for first class work.

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Please send me your booklet



Pat. 3-19-18.

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on the car equipped with

### UNIVERSAL or MARVEL SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon.

These INTENSIFIERS will make such plugs perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

**EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM**

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Write today for our attractive proposition.

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OUR LOCATION HAS ENABLED US TO BECOME

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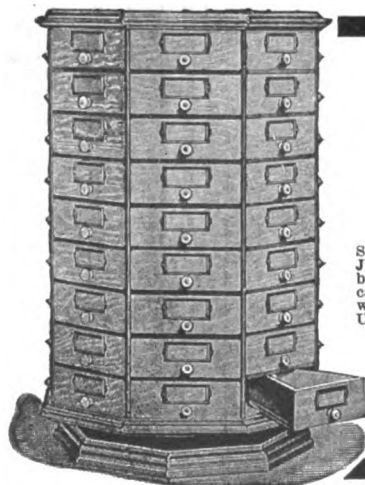
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Systematic! Conveniently Accessible! Just like "rolling off a log" to look up bolts, screws, etc., with this revolving cabinet. Everything at your finger tips, with nothing to burden your memory. Used by leading garages of this country.

Buy today from your jobber.  
Catalogue on request.

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Are turned from the best Solid Bar  
Stock and are Heat Treated. For

### STRENGTH and RELIABILITY

They are unexcelled. Ask for dealer's discount.

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*Stop Guessing—Know the Truth!*

Equip your garage with the

## Weston "Fault Finder"

Model 441

and give your customers the kind of service they demand. It means business for you. The "Fault-Finder" is a voltmeter and an Ammeter mounted in a durable, compact and convenient carrying case. The Voltmeter ranges of 0.2-0.3 and 2-0-30 volts enable the user to test out every part of the electrical equipment for practically every trouble. The ammeter range of 30-0-30 amperes is right for determining charge and discharge rates for adjusting relays, etc. The ammeter is protected against burn-out by a standard automobile type fuse accessibly located. Long rubber covered flexible cables with spring clip terminals are used for making connection between the instrument and the apparatus under test. A complete instruction book accompanies each instrument.

Get Ahead of Your Competitor. Write at once for information.

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When you get that call, be prepared to go to the rescue with a

### Holmes Wrecking Truck

You can get the crippled car to your shop quickly and easily. The time and labor saved soon pays for it. Made of the best materials with ample strength for any job.

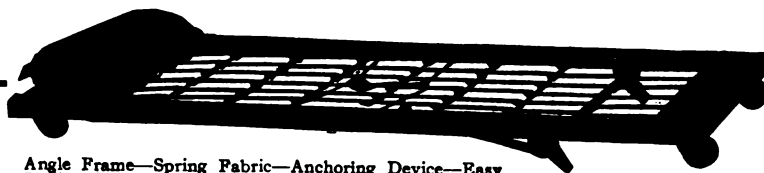


Write for full information and price

**Robt. Holmes & Bros.**  
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**Auto Repair Creeper**  
ALL-METAL CONSTRUCTION



Angle Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

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Put your repair charges on a profitable basis with

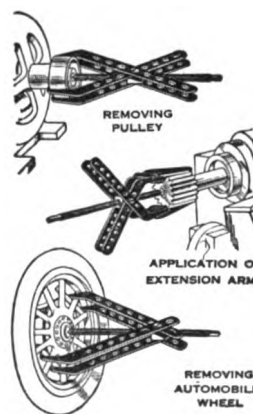


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Keep a check on your employees' time and learn exactly what each job costs. Automatic supervision turns losses into profits.

Prices moderate. Write today for booklet.

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Pulls any gear, wheel or pulley anywhere in a jiffy. Built on the only correct principle. Produces maximum efficiency with minimum effort. Can't twist off or let go. THE HARDER THE PULL—THE TIGHTER THE GRIP. Reduces operating cost and increases the earning capacity of any Repair Shop. Made from best grade drop forge steel. Almost unbreakable. Adjustable up to 13 inches diameter. Satisfaction guaranteed or money refunded. Order or write for details today. Price complete with extension arms, \$11.00.

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furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

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## SUNDERLAND'S

give satisfaction

MAGNALITE or CAST IRON PISTONS

SPECIAL PRICES ON FORD JOBS

REGRINDING NEW PISTONS

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The greatest stock in the Middle West. All parts of all standard makes. Quickest service. Great volume makes it possible to sell to you for—

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## STANDARD AUTO SALVAGE CO.

Successors to

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## AUTOMOBILE PARTS and SUPPLIES

Attractive Prices  
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Satisfaction Guaranteed

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Highest grade machinery and tool equipment, no makeshift tools. This equipment with our years of experience in the automotive business insures you highest grade work at the hands of experts. Work fully guaranteed. Patterns for all pistons, 25,000 piston rings and 5,000 wrist pins in stock. We are the acknowledged leaders in our line.

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put six cylinder smoothness into four cylinder motors, give any motor more power, more speed, quicker get away and more miles per gallon with less bearing trouble.

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keeps the motor cool, increases power and speed.

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Motors refined and tuned for speed. New and rebuilt motors in stock. Tell us your motor problems. Our increased equipment and space insures prompt service and perfect work.

Ask Our Customers

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If you are located within 500 miles of Chicago it will pay you to send us the welding, cutting and brazing work that you cannot handle. Our work is guaranteed.

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Manufacturers and Distributors of

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(FOR EVERY MAKE OF MOTOR)

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Standardized Prices

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Pistons -- Piston Rings -- Piston Pins

ALL WORK INSPECTED

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Automotive parts are going to cost more money. It is costing manufacturers more to produce cars and parts today than it ever did. Materials and labor are not only high and scarce, but are going to be higher and scarcer.

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are all that their name indicates, in quality and dependability.

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Quality Parts  
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We are the biggest wreckers in the world. The size of our business enables us to undersell all competition.

Money cheerfully refunded if you are not satisfied.

We make a specialty of our service to the trade and can supply you with practically any parts you want from stock. Orders shipped the day received. Our stock includes motors, Bosch magnetos, coils, magneto parts, rear axles complete with wheels, differentials, tires, rims, and all other parts.

Correspondence from the trade invited.

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Largest Car Wreckers in the World  
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Spur, internal, bevel, etc.

WE ALSO "CAPITOL" MARINE  
BUILD MOTOR

Special prices to the trade  
Write us today

**AUTO ENGINE WORKS**  
ST. PAUL, MINN.

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All in First Class Condition

We have on hand now a quantity in all sizes.

While they last—\$28.50 per set, F. O. B. Buffalo. Send your order NOW, with 10% deposit, and state style bead wanted.

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4 Power Wrapping Machines  
\$160 each.

1 Sectional Vulcanizer (2 cavity) \$95.00.  
(Western Vulcanizer, Chgo.)

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One qt. kerosene and 6 lbs. air pressure cleans all dirt, grit and grease from engine. Prevents wear, actually saves half the usual repairs. Quick, economical, thorough, easy and cleanly to operate. Necessity for repair shops.  
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Pays Garages Big Dividends**

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On market 5 years. Over 10,000,000 in use. Every set guaranteed. Popular thru service. Don't rebore cylinders. "NO-LEAK-O" makes good when others fail. Made different. Give results no other ring can. Write for booklet. Order from nearest Jobber, or write direct.  
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 Apco Mfg. Co., Providence, R. I.  
 Beck & Corbitt Iron Co., 1222 No. Main St., St. Louis, Mo.  
 Casco Mfg. Co., Thomasville, Ga.  
 The M. W. Duntley Co., Providence, R. I. (Re-radiator Co.)  
 New England Mills Co., 1027 W. Van Buren St., Chicago.  
 New Era Spring and Specialty Co., Grand Rapids, Mich.

## AIR COMPRESSORS

Au-to Compressor Co., Wilmington, Ohio.  
 Brunner Mfg. Co., Utica, N. Y.  
 Champion Pneumatic Machinery Co., 1402 S. Michigan Ave., Chicago.  
 Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.  
 General Utility Co., 1328 Ogden St., Philadelphia, Pa.  
 Globe Mfg. Co., Battle Creek, Mich.  
 Jackson Compressor Co., 235 S. Cherokee St., Denver, Colo.  
 U. S. Air Compressor Co., 6542 Carnegie Ave., Cleveland, O.  
 Utility Sales Corp., 808 New Stock Exchange Bldg., Philadelphia.

## APRONS

Balley-Drake Co., 1120 So. Michigan Ave., Chicago.

## AUXILIARY RIMS

Foley Traction Rim Co., 827 Hennepin Ave., Minneapolis, Minn.

## AUXILIARY STEERING EQUIPMENT

Casco Mfg. Co., Thomasville, Ga.  
 Meixell Co., Indianapolis, Ind.

## AXLES (EMERGENCY)

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## BALL AND ROLLER BEARINGS

Graham Roller Bearing Co., Coudersport, Pa.  
 The Norma Company of America, 1790 Broadway, New York City.

## BATTERY RECTIFIERS

Kentucky Electrical Co., Inc., Owensboro, Ky.

## BODIES

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## BODY CLEANERS AND POLISHES

Davies-Young Soap Co., Dayton, Ohio.  
 Waxit Mfg. Co., 1539 Plymouth Bldg., Minneapolis, Minn.

## BOOKS

American Technical Society, Chicago.  
 H. E. Phillips & Co., Union City, Ind.  
 Jeffrey & McPherson Co., Minneapolis, Minn.

## BUMPERS

New Era Spring & Specialty Co., 1152 Hamilton Ave., Grand Rapids, Mich.

## CABINETS

American Bolt & Screw Case Co., Dayton, Ohio.

## CARBURETORS

Marvel Carburetor Co., Flint, Mich.

## CASH REGISTERS

National Cash Register Co., Dayton, O.

## CLEANSERS

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 Green Engineering Co., Dayton, Ohio.  
 Spencer Metal Products Co., 624 S. Michigan Ave., Chicago. 16 to 24 W. 61st St., New York.

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## CREEPERS (For Repair Shops)

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 Green Engineering Co., Dayton, Ohio.  
 Helser Special Tool Co., 2001-21 Washington St., Kansas City, Mo.  
 Marvel Machinery Co., Minneapolis, Minn.  
 St. Paul Auto Cylinder Grinding Co., 1152 Rice St., St. Paul, Minn.  
 Storm Mfg. Co., Thompson, Iowa.  
 Universal Tool Co., 435 Woodward Ave., Detroit.

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Am-pé-co Sales Co., Marshalltown, Iowa.

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Auto Engine Wks., St. Paul.

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Premier Motor Products Co., 3945 No. Robey St., Chicago.

## FAN BELT GUIDES

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Casco Mfg. Co., Thomasville, Ga.

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W. M. Finch & Co., Detroit, Mich.  
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Marvel Machinery Co., Minneapolis, Minn.  
 Romort Mfg. Co., Oakfield, Wis.

Storm Mfg. Co., Thompson, Iowa.  
 Zinke Co., The, 1328 So. Michigan Ave., Chicago.

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Milwaukee Tank Works, Milwaukee, Wis.

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Rutler Mfg. Co., Indianapolis, Ind.  
 Ever-Tight Plaston Ring Co., 1609 Kingsland Ave., St. Louis.

Fore Electrical Mfg. Co., Inc., 5255 N. Market St., St. Louis, Mo.

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Utility Sales Corp., 808 New Stock Exchange Bldg., Philadelphia.

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Harvey Spring & Forging Co., Racine, Wis.

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## VALVE GRINDERS

Stenman Electric Valve Grinder Co., 41 Southbridge Ave., Worcester, Mass.

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Vanderpool Vulcanizing Co., Springfield, Ohio.

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## WRECKING TRUCKS

Robt. Holmes & Bro., Danville, Ill.

## WRENCHES

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The Graham Roller Bearing Co., Coudersport, Pa.



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More power with less gas and oil guaranteed

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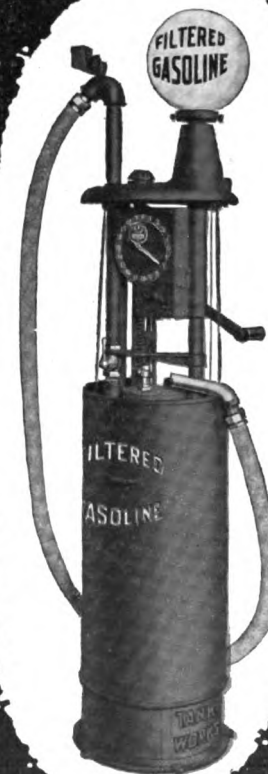
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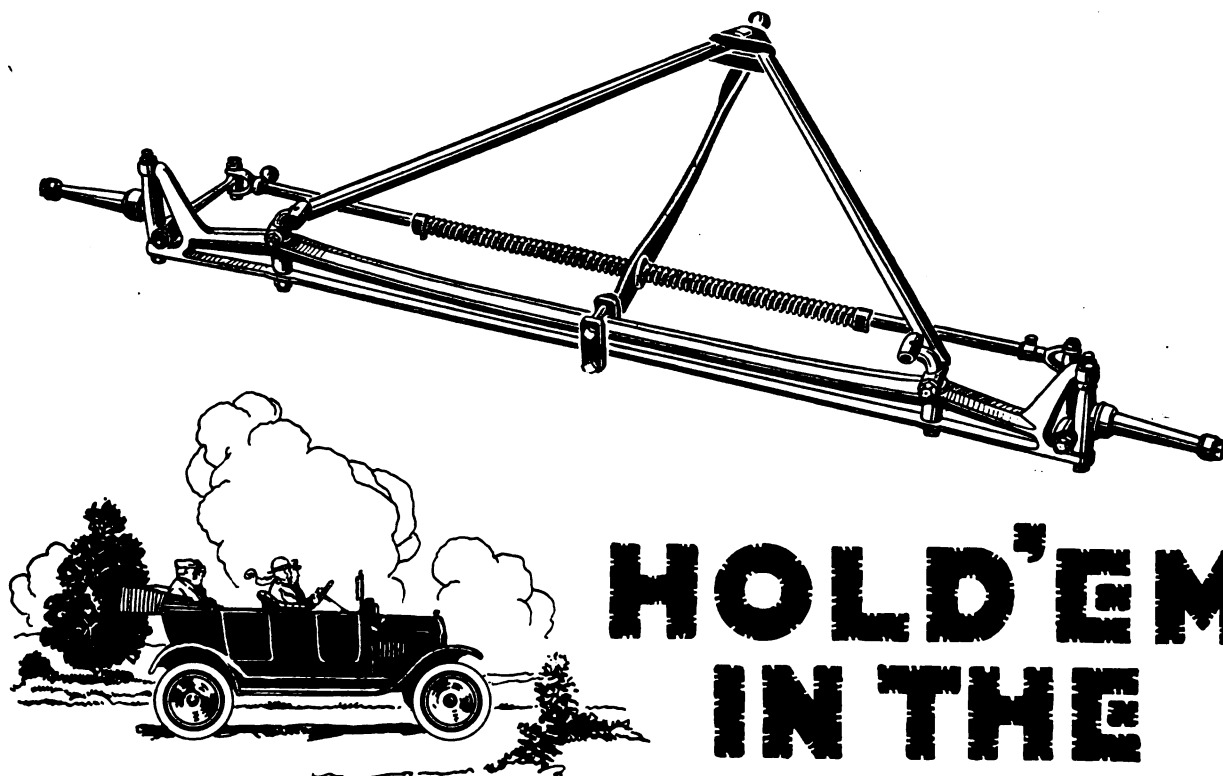
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As its name indicates, "Hold 'Em in the Road" was designed to give the Ford driver better control over his car. It combines four valuable attachments in one—Radius Rod Brace, Anti-Rattler Axle Support, and Steering Device.

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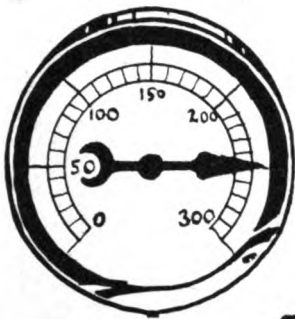
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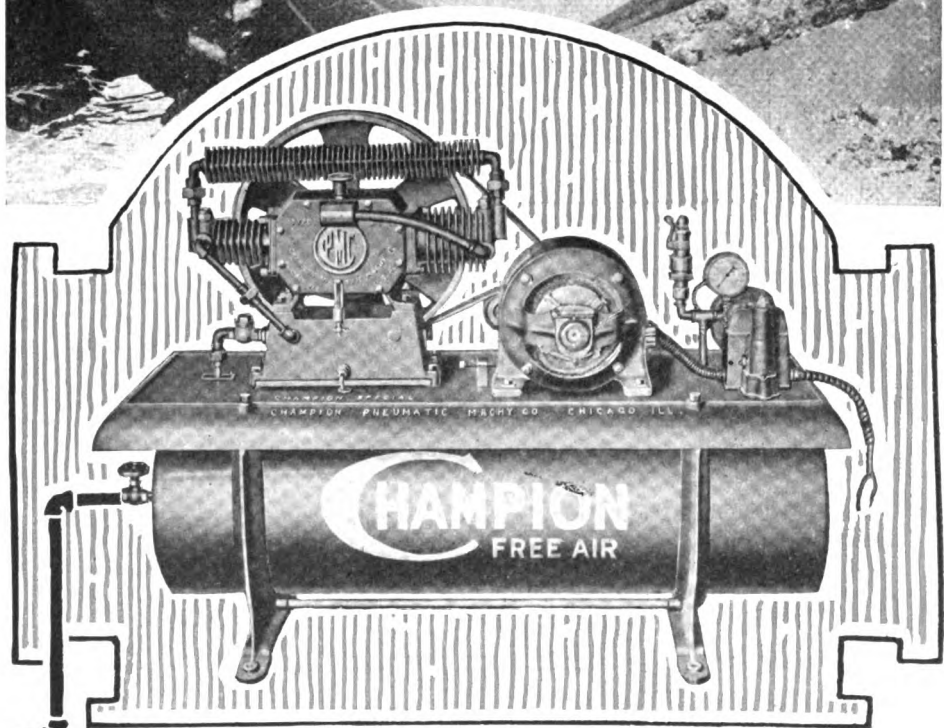
will enable you to furnish the biggest trucks with satisfactory air service. The tank furnished with the Champion Special Automatic Air Unit is tested for 250 lbs. working pressure, affording ample power. The **CHAMPION** is the fastest two-stage compressor on the market, and at the same time is noted for its low power cost and upkeep. The best of everything in the way of engineering skill, materials, and workmanship is embodied in the Champion.

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**Champion Pneumatic Machinery Co.**

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 Providence, R. I., U. S. A





# American Garage & Auto Dealer

Published Monthly  
116 So. Michigan Ave.  
CHICAGO, ILL.

MAY 1920

Vol. 11—No. 5.  
10 Cents the Copy  
\$1.00 Per Year.



Millions Have Bought It  
—*millions more need it!*

Millions of SHALER 5-Minute Vulcanizers have been sold to motorists. Millions of other motorists are being induced, through our large advertising campaign, to want the SHALER 5-Minute Vulcanizer.

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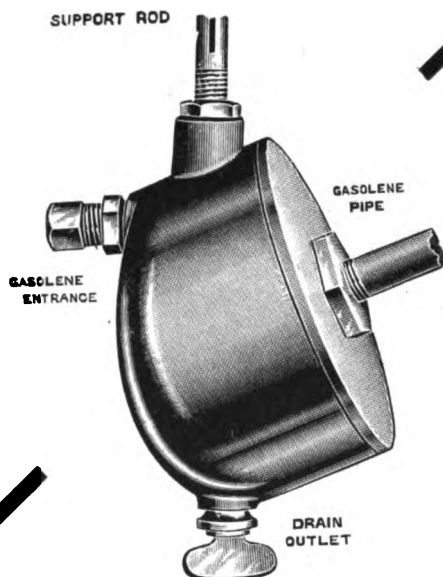
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*Oldest and Largest Manufacturers of Vulcanizers in the World.*





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There is only one design of Universal Gasoline Purifier, and it can be installed on any **AUTOMOBILE, TRUCK, TRACTOR, AEROPLANE**, or any other internal combustion motor using gasoline or kerosene as a fuel.

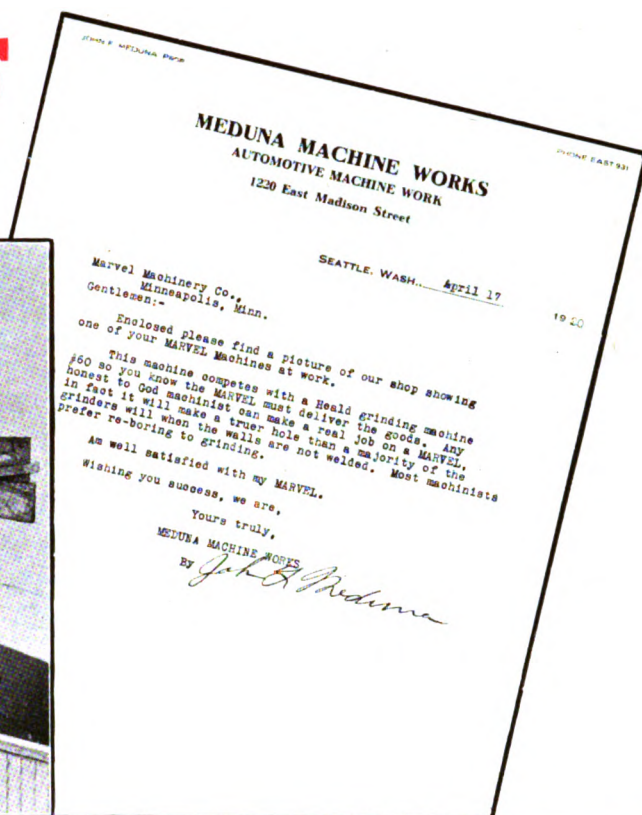
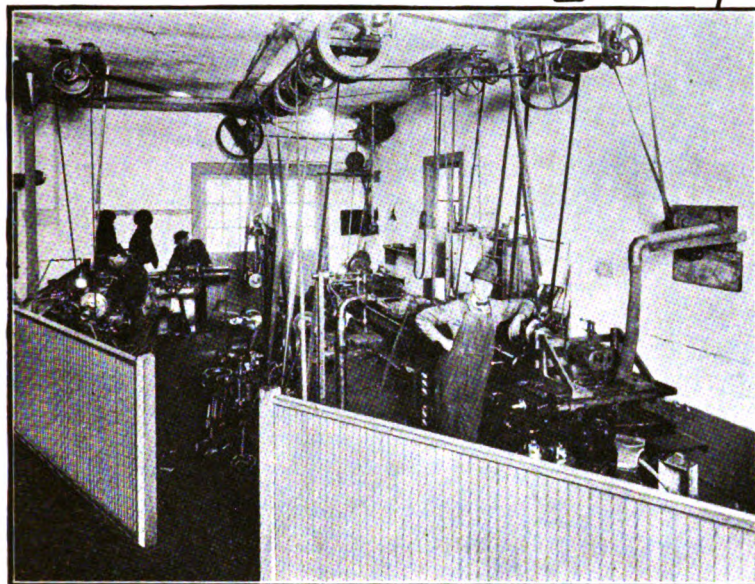
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**Dealers:** *This is your chance to cash in on the big demand that is already apparent. Write for full particulars today.*

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Better write today. We will be glad to go into the matter in detail with you. We will show you how easy it is to own a MARVEL—how soon it will pay for itself—after that it is all velvet.

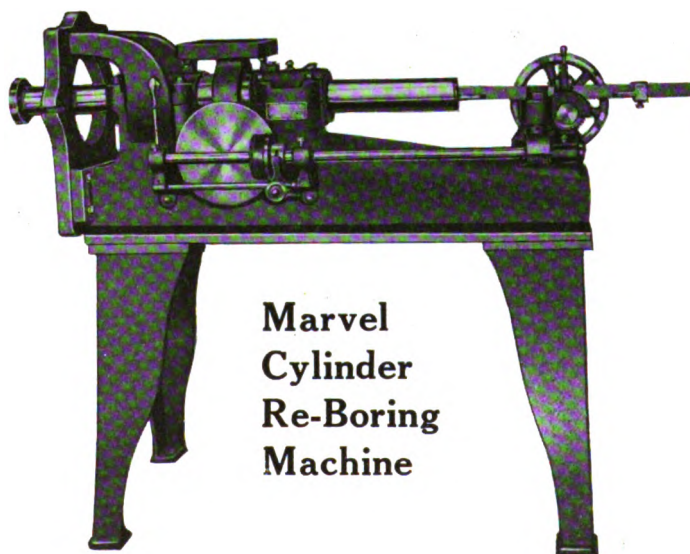


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## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# American Garage & Auto Dealer

Published Monthly

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**A Ford Controlling Itself**

SPINDLE CONNECTING ROD (OR TIE ROD) BENT FROM THE STRAIN OF SHOCKS AND JOLTS WHICH WEAKENS THE ENTIRE FRONT SYSTEM AND THROWS THE FRONT WHEELS OUT OF ALIGNMENT

STEERING CONNECTING ROD BUCKLED FROM STRAIN OF SHOCKS AND JOLTS AND THE DANGER OF GOING OVER CENTER TRAVEL WHICH MEANS THE LOSS OF CONTROL IN —

**The Over-land Guide**  
PATENTED  
*Controlling the Ford*

SPINDLE CONNECTING ROD (OR TIE ROD) RELIEVED OF THE STRAIN FROM SHOCKS AND JOLTS WITH THE OVER-LAND GUIDE

STEERING CONNECTING ROD BUCKLING STRAIN REMOVED AND THE DANGER OF GOING OVER CENTER TRAVEL PREVENTED BY

## The Over-land Guide Pays for Itself Every Two Weeks in Reduced Wear and Tear

This broad guarantee protects users of the Over-Land Guide. Send us retail price, **\$8.50** and we will send you, parcel post, one Over-Land Guide. Use it 20 days, properly installed, and if at the end of that time it does not do all we claim for it, full purchase price will be refunded.

In addition to the protection that it affords against accidents.

There are certain parts of the Ford car which are ordinarily subjected to undue strain that sooner or later results in breakage and repair bills. The Over-Land Guide relieves the strain on these parts, eliminates the repair jobs that are a constant drain on the pockets of the Ford owner.

It stops the wobbling and scooting of the front wheels, thus saving at least \$30 a year in tires alone. It relieves the strain on the front system and steering mechanism, takes up all lost motion, eliminates the shocks and vibration from all the ball joints and bushings in the front system and steering mechanism and, in fact, all joints and bushings that constitute a Ford car or truck.

The Over-Land Guide also reduces breakage and repairs of all the following parts—such as spindle connecting rod (or tie rod); spindle body arms and bushings; spindle body and bushings; ball and roller bearings and hub; steering connecting rod and ball joints; steering gear drive pinion and steering gear pinions; steering gear internal gear case and bushings; also prevents the axle from bending—and may save your entire car from destruction with loss of lives of occupants.

One of the many repair jobs which the Over-Land Guide prevents will more than pay for its cost. It also saves money on the time lost when the car or truck is laid up in the repairshop.

In addition, the Over-Land Guide is life insurance to Fords and Ford owners, and relieves the driver of the customary physical and mental strain.

This test will demonstrate its value. After the Over-Land Guide is installed, give it a severe test and try-out. Drive the car over the roughest roads you can find, and when you strike a hole six or seven inches deep, remove your hands from the steering wheel, regardless of the speed you are driving. Then you will realize how the Over-Land Guide controls the running of the car, absorbs all shocks, and eliminates the strain and vibration from the front system and steering mechanism.

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## THE MEIXELL COMPANY

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In ordering state the year your car was made.

Unlike all other STEERING DEVICES, the SPRING in the Over-Land Guide is packed in hard grease and completely enclosed, which keeps it free from dust and moisture and means indefinite service and no up-keep.



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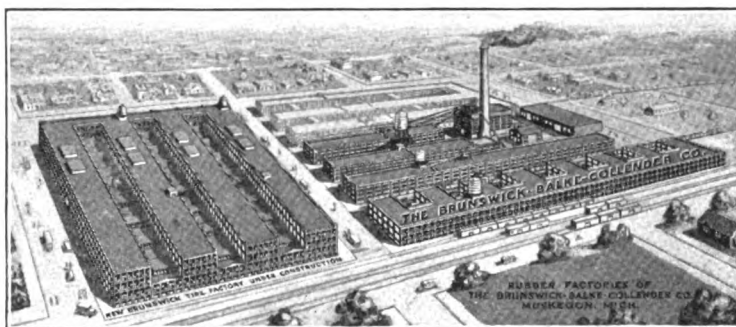
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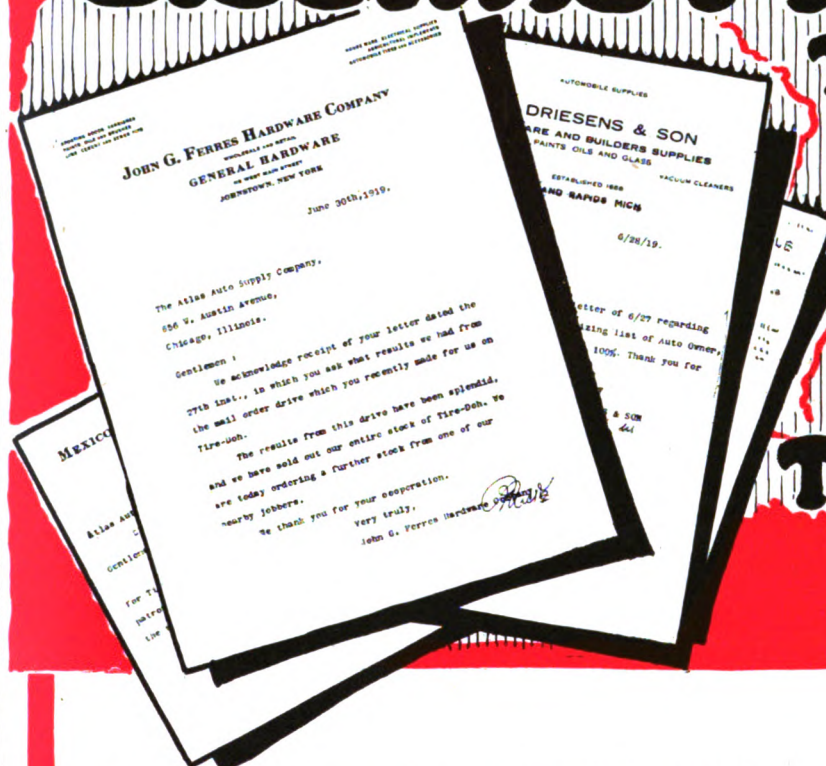
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country  
say about  
**TIRE-DOH**



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## Our New Process of Sealing prevents deterioration—helps sales

When you sell a customer TIRE-DOH in a can bearing our "NU-SEAL," you can guarantee that it will be fresh and usable to the end, provided, he will take the care to replace lids tightly. Consider how this guarantee will aid you in making sales—especially to the motorist who is buying TIRE-DOH for the first time.

We furnish Special Dealer Helps covering this new feature. Write today for complete information.



## ATLAS AUTO SUPPLY CO.

680 West Austin Avenue

Chicago



# American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,  
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XI. No. 5

CHICAGO

May, 1920

## Service—A Yardstick.

"Service—a yardstick" are the catch words of an advertisement by one of the big Chicago stores which recently appeared.

"Service is the yardstick by which men and institutions are measured. Only by service is growth possible and progress marked."

These words apply equally well to the automotive industry. The department store which published the advertisement, animated always with this ideal of service, has developed from a small building to occupying almost an entire block—from a small business to one noted for its world-wide resources. Thus is the power of service illustrated in commercial life.

The war threw everything out of joint and automotive service suffered along with everything else. There were various reasons for depreciation of service. First—there was more traffic—the automobile was used for more purposes than ever before. There was a shortage of help all the way around. Then materials were hard to obtain and prices high.

All of these factors entered into a slowing up of automotive service—and some of them still obtain. But the war is over—and the public, the patrons of the automotive service, are looking for the kind of service rendered them a few short years ago.

Garagemen and dealers should be thinking of service and planning improvements—but it is always easier to tear down than to build up, so

rapid progress cannot be expected. But steady progress can and should be made toward giving an improved service, one that cannot be the cause for specific complaints, as business and economic conditions become more stabilized.

"Service" is a magical word, but

---

## Be Human!

The art of salesmanship begins in the mind. Think success, think confidence, think a thousand dollars. Why think fifty cents? These thoughts in your brain will ooze out of your face. You will radiate these qualities. The greatest factor in selling is personality.

Avoid personal intimacies. Let me talk about myself and look interested while I am expanding. But don't speak of yourself any more than you can help. Take an axe and chop the pronoun "I" out of your vocabulary. What do you care? Jolly the buyer along.—The Salt Seller.

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back of it all lies hard work, everlasting stick-to-it-iveness on the part of every employe in the automotive industry, and efficient and well-maintained equipment and facilities. Many different factors enter into the furnishing of service and each requires careful study and analysis, for a fault in anyone may destroy or nullify the good influence exerted by the others.

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## Storage Batteries

Storage batteries are usually considered as something quite mysterious, for the average person has never

paid much attention to them. The theory of the lead plate storage battery, however, is quite simple.

Chemistry teaches that when different elements or materials combine, energy is always either absorbed or given out, and when combinations are right, this energy may be made to show itself in the form of electrical current.

During discharge of a storage battery, the lead and sulphuric acid of the cell combine to form a salt of lead, and the energy from the combination shows itself in the form of electrical current. During charge, the reverse action takes place. The current in passing through the cell breaks up the combination, driving out the acid from the plates into the electrolyte until the combination is entirely broken up. The cell is then in its original condition ready for another discharge.

Contrary to the general idea, none of the acid is lost or used up during the working of a cell and does not have to be replaced. Due to this misunderstanding, acid is frequently added to cells when they do not require it.

The acid of the electrolyte should be left alone and none added except when the cells are being overhauled—that is, when they are being cleaned, a new plate added, or when acid is lost due to cracked jars. Water from the electrolyte is lost due to gassing

and evaporation and has to be replaced. Distilled water is always the safest to use for this purpose.

There are three points which must be thoroughly understood in battery work. These are: Charge, the discharge, and the electrolyte.

In charging, the aim should be to put the proper amount of current into the cells with the least amount of gassing or heating. The charging rate can be as high or as low as one pleases to make it without injury—but the charging rate should be cut down to normal before gassing takes place.

When to stop charging may be determined in one or more of four ways: By noting the specific gravity of the electrolyte; the voltage; the gassing; and four by the efficiency method.

The storage battery should never be discharged too far. It can be safely discharged at any rate which the connections will stand, provided it is not run down too low. The combination, during discharge, of the acid with the lead plate occupies a larger space than the lead itself and therefore tends to expand the plates. If the action is allowed to go too far it will cause the plates to buckle or even break. The specific gravity of the electrolyte and voltage reading should be used as checks.

Care and carefulness are really the principal factors in keeping storage batteries in condition.

In this issue appears the first of a series of practical articles relating to storage batteries. A careful reading of these articles will clear up many of the points regarding storage batteries which have puzzled gagemen.

### The "Why" of Greater Production.

"Inflation" is a word which is used a great deal these days. There is no doubt about it; we are living in a period of inflation—and the sooner that we can deflate, the better off we

will be. But the deflation must be accomplished gradually in order to see us safely through it.

It was not so long ago that the word "expansion" was greatly used and it was followed by the use of the word "inflation." Both words are used with respect to our money, or rather, our currency.

Just where expansion ended and inflation began is rather difficult to say. This much, however, may be said: Expansion ended and inflation

**Confidence in our Government is what is making business possible now. Confidence is an asset. Unless people have confidence in you, you might as well break stone first as last. What are you doing to INCREASE your Capital of Confidence this spring?**

began when for the expenditure of the same amount of money, there was no greater production.

In 1914 business in this country was fair. There were plenty of men and plenty of jobs. As the years passed, this condition changed. There were plenty of jobs but not plenty of men. The slack had been taken up and all available men were at work. In other words, we had expanded.

With the condition of many jobs and few men, competition for services of men began and prices were paid for their services greatly out of proportion to the amount of work done. In fact, no greater production was obtained.

Thus inflation began, for it was easy to obtain money. The manufacturer was able to make loans from his banker without difficulty and, in turn, because the banker was easy on him, he was easy on his employees and paid higher wages than his competitor in order to get the men to do his work.

"Easy money" all the way around. The amount of gold in this country

had greatly increased—and the gold reserve of the banks is what determines whether money shall be "tight" or "easy."

Briefly, these are the underlying reasons why we hear so much about the necessity for greater production. The effort to obtain greater production is merely one step in the deflation process—and it is a step which will greatly assist in bringing about the deflation with the least possible danger.

The United States Chamber of Commerce, at its annual meeting held in Atlantic City the latter part of last month, was designated as an "increased production convention." There it was agreed that the country's problems can be largely solved through increased production, and economy must be practiced by public authorities and by every citizen.

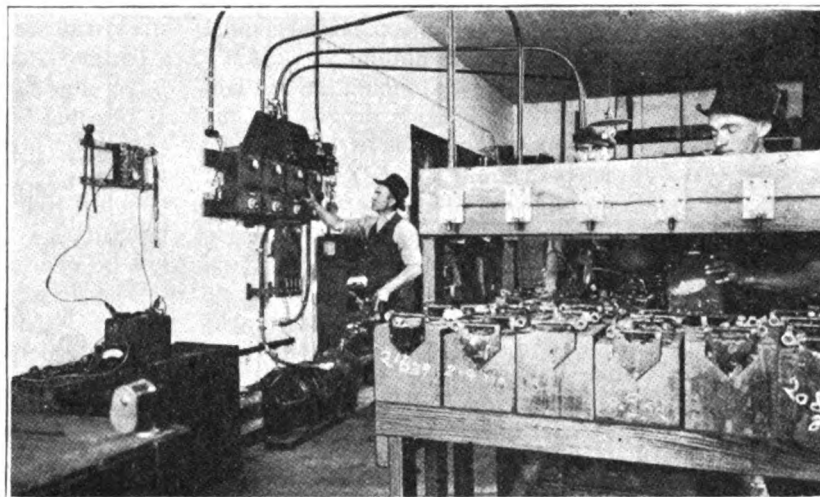
It is realized that the world problem today is production and that the responsibility to produce lies on all alike—the manufacturer, the merchant, the farmer, the worker. That is why everyone cries for greater production.

The question of labor in relation to production is a most important one at the present time.

A number of years ago, Elbert Hubbard wrote: "If you work for a man, in Heaven's name work for him. If he pays wages that supply your bread and butter, work for him, speak well of him, stand by him and the institution he represents."

The message of Hubbard, who went down with the Lusitania, is particularly applicable to present-day conditions, and not only should his doctrine be preached by executives to employees, but it should be practiced by them also. Let everybody work for greater production! That, after all, is the only way to solve the H. C. L. problem without courting disaster.

# B A T T E R Y



# S E R V I C E

The First of Series of Articles on Battery Service—The Layout of the Shop in Relation to the Garage Building Is Explained—Electric Facilities, Floor Space Required, Lighting—Proper Routing of Storage Batteries Through Shop—Readers Urged to Write in for Layouts to Meet Requirements

By Vincent W. Cunningham

This is the era of self-starting automobiles. To Mr. Average Motorist this characteristic of the present day motor car means a great deal. However, the fact remains that for all the care which he may lavish upon the finish of his car, he pays little heed to the upkeep of the electrical system of his automobile. He may be proficient and adept in the use of the oil can, but he has one tendency—to almost neglect the little black box under the cushions of the front seat, known as the battery.

The battery of the automobile has a story to tell of misuse, and neglect in many cases. The story told to the battery repairman, often before the battery has been operated on diagnosis on his part, is quite accurate, and to say that the average battery needs expert attention several times a year is not overstating the case. Hence the importance of battery service.

Batteries have a way of suddenly ceasing to function. Mr. Average Motorist becomes aware of the fact when he notes that the lights will not burn, or that the starter will not operate. As things electrical are beyond his ken with the tools at his command, he drives to the garage or service station for relief.

But which place? That is the question. If the city boasts of an "auto row," he drives thither. Every autoist knows where to hunt for the garage section of town in case of trouble, for the reason that it is generally lo-

.....  
 ● With the demand for battery ●  
 ● service daily increasing, the ga- ●  
 ● rageman should not overlook the ●  
 ● opportunity of establishing a busi- ●  
 ● ness which will co-ordinate the ●  
 ● automobile service problem. ●  
 ● Automobile service should mean ●  
 ● complete accommodation and effi- ●  
 ● cient repair work. Today, too ●  
 ● often it is anything but that. You ●  
 ● as a garageman must render auto- ●  
 ● mobile service, not as it is being ●  
 ● given but as it should. ●  
 ● The battery and the electrical ●  
 ● equipment are the vital parts of ●  
 ● an automobile. In importance, ●  
 ● they are equal to any engine or ●  
 ● chassis-repair part. You equip ●  
 ● your shop to handle these repairs, ●  
 ● why not batteries? Why not make ●  
 ● your business complete, make it ●  
 ● individual, make it really mean ●  
 ● service by equipping your garage ●  
 ● for battery work? ●  
 ● .....

cated along the "beaten path" of motor travel. Hence it behooves the garageman, seeking the patronage of this class of work, to equip his place with battery charging and battery repair equipment.

Advertising is one of the wonder workers of the present age—its benefits are enormous. The free advertising which a well-equipped battery shop receives is as much of a factor in building up a large trade as is the reputation for satisfactory work—a factor in holding the trade of the regular patron.

Too much can not be said for the layout of the shop and proper equipment. The battery service shop must also have facilities in the form of electric power to supply energy for battery charging, although generator sets may be used if power can not be obtained. Gas supply is desirable for lead burning and sweating of terminals, blowpipe use, etc.

While a great deal of floor space need not be required for battery repair work, space must be allowed for the parking of cars without crowding. Taking batteries out of cars is heavy work, and climbing over the other cars makes it even more difficult.

Lighting in this battery section of the garage should be as good as it is in the shop; and it is essential there. The exchange of batteries, and tracing of wiring and cables, are much facilitated by daylight and plenty of it. The writer has had occasion to connect up a battery in a certain garage, which took him easily three times as long as necessary—the extra time required being due to the lack of light.

With a number of cars to be checked up, batteries installed or removed, and within a reasonable amount of time, it is evident that poor lighting of the parking space may even require the employment of an extra attendant, if any reputation for prompt service is to be maintained.

Having considered the parking space, we will now follow the battery awaiting repair through the several portions of the shop which it passes

in the process of being renovated.

On entering the garage, the attendant directs the owner of the vehicle to drive to a suitable place, and brings his instruments with which to locate the difficulty. Finding the battery at fault, he removes it and places it on the "dolly" to take it to the shop. On the way, he stops at the office where the owner receives his receipt and signs a contract for the rental battery to replace his own with temporarily.

While waiting for the installation of the rental battery to be completed, the driver's attention may well be directed, and with profit, to a small showcase containing useful and appealing electrical appliances. The attendant may also act as salesman—all of which increases the efficiency of the battery shop as a divided producer.

In many cases, the attendant upon installing the rental battery, reports that his tests show that the starter or the generator do not function properly. Complete electrical service is demanded by the car owner and nothing is more conducive to good service than a supply of generator and starter brushes. Provisions should be made for the stockroom to carry a line of starter brushes, fuses, generator parts, contact points, etc.—at least, for the most popular and largely used electrical systems.

The complete battery shop must be laid out with the idea in mind of making the best use of all facilities available. Efficient service demands it. The handling of batteries, which may

easily weigh up to 100 pounds, must be reduced to a minimum.

The shop itself should be so laid out that as the work progresses, the battery moves in the shortest and most direct path from the racks wherein it is stored while awaiting attention, to the steaming vat, and to the work bench where it is opened, repaired and assembled. Then to the charging racks, and finally to the storage racks awaiting the car owner's return to claim it.

At best, considerable lifting and carrying is necessary and with a constant stream of batteries passing through the repairing process, the workman must handle and lift as little as possible if his work is to be of the best kind.

Referring to the accompanying sketch of a garage and shop layout, it will be noted that this particular battery service station is well located in the garage and equally so in its arrangement as it is placed in the front end of the garage opposite the office.

This particular type of garage was selected because of its predominance. It may not meet the reader's garage plans or facilities, but it will serve to explain the arrangement of the equipment. Those who are interested are urged to write us concerning their individual requirements. We shall gladly submit plans to meet their specifications.

Most 50 ft. by 100 ft. garages have an office on one side and use the opposite space for storage purposes. Where this is the case, the storage

space can be very easily utilized for a battery shop.

To eliminate as much artificial light as possible, it will, first of all, be necessary to break the wall and insert windows. A skylight would further help to light up the shop. Proper lighting is very important and should not be overlooked.

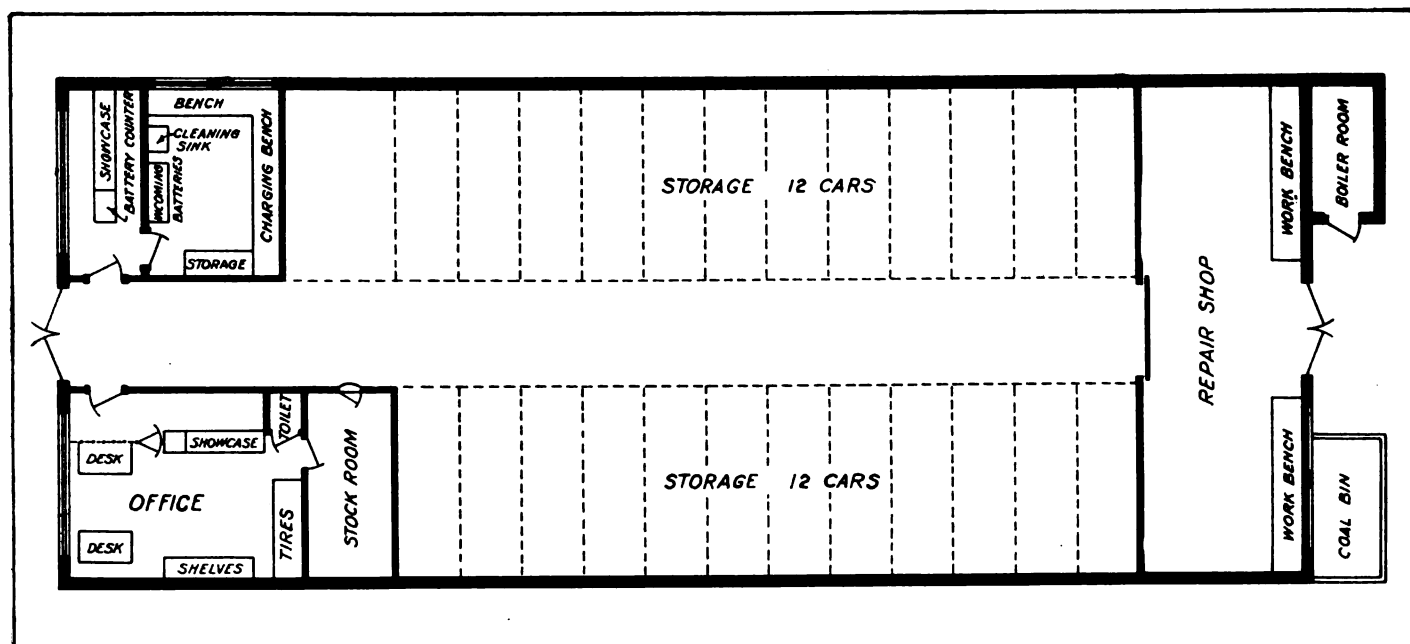
The floor space should be about 18 ft. by 20 ft. with a partition and swinging doors as shown. The front part should have a showcase and battery counter. Under the battery counter, drawers should be provided for repair orders, tags, etc. In the showcase, an assortment of electrical equipment and accessories can be displayed to good advantage and profit.

In the battery shop proper, and immediately at the door, should be shelves for storing the incoming batteries and next to them a cleaning sink and battery steamer. The work bench should be located in front of the windows, and immediately to the right of it the charging bench or rack. To the right of the charging bench and at the door, should be another series of shelves for finished and rental batteries.

With this arrangement, the battery is passed along its course in the shop in the proper sequence and with the least amount of lifting and shifting.

Provision should also be made for parking the car when making the electrical tests. This can be taken care of by having a parking space in the garage next to the battery shop.

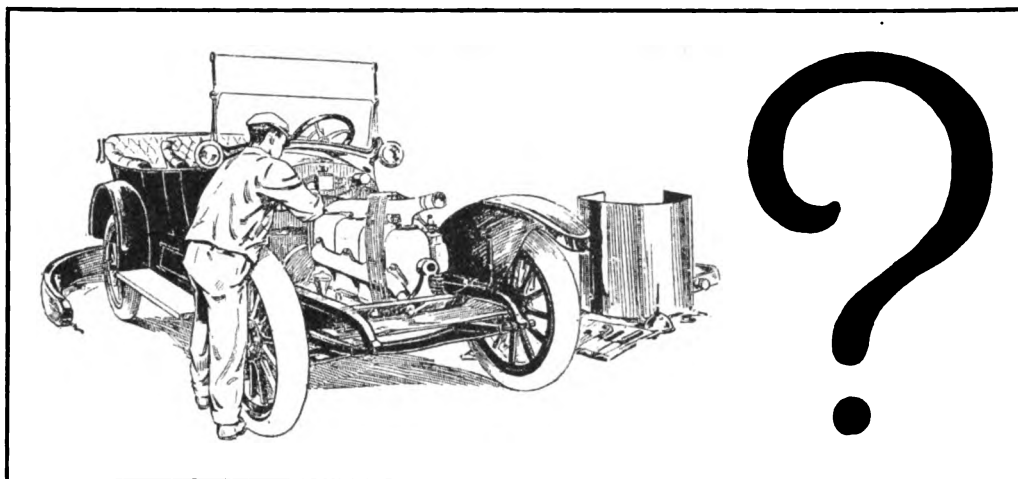
(Concluded on page 42)



Garage and Shop Layout Showing Ideal Arrangement for Taking Care of Batteries.



# When Is a New Part Nec- essary?



Maybe You Think This Question Is Easy to Answer—Yes, It's Simple but Very Disagreeable Because Opinion Will Vary So Much that Sometimes When You Put in One Tiny Part Which the Owner Thinks Unnecessary, He Brands You a Robber—Suggestions That Help to Answer the Question

By C. M. Adams

"I wish Billy'd been back here last week when your battery went bad. He's a battery hound," the proprietor of the humble little around-the-corner garage remarked, after introducing a friend who had just returned from France. "But I suppose you've got it fixed by this time."

The man in the light-six whose gas tank was being filled, smiled ruefully. "Yes. I've already kissed my seventy-five iron men goodby."

"They sold you a new one?" Billy inquired.

The man in the six nodded. "I went to the battery service people and they told me my old one wasn't worth fixing." He pointed to the floor of the tonneau. "Brought it along just for fun. Always wanted to see what was inside of 'em. I'm just on my way home from there now."

The "battery hound" was regarding the long scaled-top box with interest. "Mind if I give this the once over?" he inquired.

"Go as far as you like. Guess you can't hurt it any," the owner assented smilingly.

The "battery hound" did give it the once-over. After a preliminary inspection and test, he took it home and within three days brought back the battery which wasn't worth fixing. It needed only fresh solution, a little cleaning and a thorough charging to put it in first-class condition for regular service.

Exactly what that battery owner said at that time cannot be reproduced here, but what does seem necessary to

state here is the fact that incidents similar to the foregoing have occurred with sufficient frequency to cause many car owners to look with doubt upon repairmen, all because of the question: "When is a new part necessary?"

Academically, the question is quite simple. An old part is either still fit for service or not fit for service. Practically, the new part problem offers one of the most disagreeable

.....  
 ● Method goes far to prevent ●  
 ● trouble in business; for it makes ●  
 ● the task easy, hinders confusion, ●  
 ● saves abundance of time, and in- ●  
 ● structs those who have business ●  
 ● depending what to do and what to ●  
 ● hope.—William Penn. ●  
 ●.....

questions the repairman has to answer, because opinion will vary on the point of when a new part is actually necessary.

He must put in new parts to replace those which have been worn, if he is to turn out an honest piece of work. Yet the instant he puts in one tiny part, which the car owner thinks is not necessary, he is branded a thief and a robber and, of course, in six cases out of seven, the owner always knows more about cars than does the most expert mechanic.

To meet this difficult situation repairmen have evolved several methods. What has been used possibly more than any other is the blanket in-

struction clause in the repair order form signed by the car owner. This empowers the repairman to supply all parts which prove necessary and is a legally binding provision. But it is far from satisfactory.

So some repairmen have attempted to write into the order form a complete list of the parts necessary. But this has obviously been unsatisfactory, because in cases of extensive repairs exactly what is needed cannot be determined until the work has progressed at least to the tearing down of the car.

Still other repairmen have asked the consent of the car owner before putting in new parts. This naturally results in considerable delays in the work, annoyance to owners, and eventually in dissatisfaction, for owners usually do not know whether a part is actually required or not.

So after all, what is most needed for an adequate solution is not so much a single hard and fast system as a broad general policy. In the last analysis, the relation between a car owner and the repairman is a confidential one. The repairman is the car doctor.

In the light of this fact, it will do little good for the repairman to inform the owner in a blunt, high-and-mighty manner that, "We'll put in what new parts we think are necessary. We know more about that than you do." Neither will it do to call the owner to the telephone and inquire meekly: "Do you want your

(Concluded on page 38)

# Are Your Side Lines in a Rut?

His Business Was Like a Heavy Car on a Missouri Hill After a Three-days' Rain—When It Came to Giving the Business Gas, He Fairly Stepped on 'er with Both Feet—But He Got No Nearer the Top—What Was Wrong?

By F. B. Parden

Hardup Nut-Twister's garage business was like a heavy car on a Missouri hill after a three days' rain. The more gas he gave it, the more it skidded. His garage had 60 customers who stored their cars there, but the storage and gas and oil sales did not show the profit they used to. His business future was no wider than a one-track Missouri road with a ten-foot ditch on one side and a gully, Heaven knows how deep, on the other.

Nobody could blame Nut-Twister for lack of pep. When it came to giving the business gas, he fairly stepped on 'er with both feet. But as said before, Nut-Twister's chariot of business was rutting all over the road, no nearer the top, but nearer the bottom.

"What you need," advised Nut-Twister's best friend, "are skid chains. Something to catch that excess power you are throwing away. You need something to steady yourself—something to catch hold with."

"What do you mean, skid chains? This is no taxicab establishment. This is a garage business."

"That's another point against you," interrupted his friend. "You have your head under the cowl, the top and all the curtains up! You ought to straighten up and look around—to get out and walk if necessary. Stimulate your imagination. See if you can't think; try to for at least ten minutes every day. When I say put on skid

**It Wouldn't Be Here  
If Owner Had Let Us Keep the  
Carbon Burned Out  
At 50 Cents a Cylinder.**

Fig. 1—Boosting Carbon Burning.

chains, I mean whoop up your side lines. I'll be explicit:

"Do you burn carbon?"

"Yes, when anybody wants it burned."

"You are foolish. You don't want to wait until some stranger stumbles in here by accident and has his carbon burned. I have a car and you have never yet asked me whether I

need the carbon burned. Did you ever pass a drug store with a big, red, patent-medicine sign in the window that began something like this, 'No man, nor woman, can enjoy life with a weak or sour stomach, biliousness

**Brakes Relined Overnight  
Or  
In Two to Five Hours.**

Fig. 2—An Appealing Inducement.

and headache,' without feeling just a little queer, wondering whether your stomach was all right?

"Well, no man should drive past your garage without a similar feeling about the carbon in his engine. Take that junk cylinder block out of the back of your garage, paint it up loud and hang it over the sidewalk with a sign like this (Fig. 1).

"That particular line will stand a lot of booming.

"Do you have much repair work?"

"Not so much nowadays. The manufacturer's service station gets most of it."

"You just try this and see if you do not get more than you can do! Specialize on relining brakes. Pull out your stock of wheel-pullers and offer this inducement. (See Fig. 2.)

"It is the time element that forces motorists, particularly tourists, to delay necessary work on the machines. Specialize on this fact and you will find little or no competition.

"I know you wash cars, for I had

**We Clean  
Your Car and Engine  
For the Price of One.**

Fig. 3—Announcing a Bargain.

mine washed here, but how many a day?"

"Sometimes eight, sometimes a dozen," replied Nut-Twister, who was now thinking hard.

"There you are; this is your big opportunity. You should do 15 or 20 a day. You can get them by the recognized principle, offering owners more service for their \$1.50 than anybody

else in town. Why not let it be known by means of cards like this?" And he lettered a card (Fig. 3).

Nut-Twister was becoming enthusiastic, but he objected here. "It won't pay. I'll have to get more help. One man can't do all this. This extra service takes time, and time is money."

"Not so! You can take a kerosene cleaner, hitch it to your air line, blow out the engine pan, and clean the oil and dust-muck off the engine in less than ten minutes. With the aluminum showing once more and the muck off the water pump and manifold, this service looks well. The drivers of some cars, particularly fine cars, keep the engine clean, but of the cheaper cars, the great majority are a sight to see when the hood is raised; besides, a dirty engine is dangerous and invites fire. If your worker depends on the sponge or round brush for washing spokes have it stopped. A flat brush with long soft bristles around the edge is the fastest and best tool for washing spokes. And on the spokes, the most time is ordinarily spent.

"There is one other big side line, and it will stand all the whooping up you can give it by means of cards like these (Fig. 4). Success depends

**If You Want  
Your Car to Look Dressy,  
Let Us Dress the Top—\$2.00**

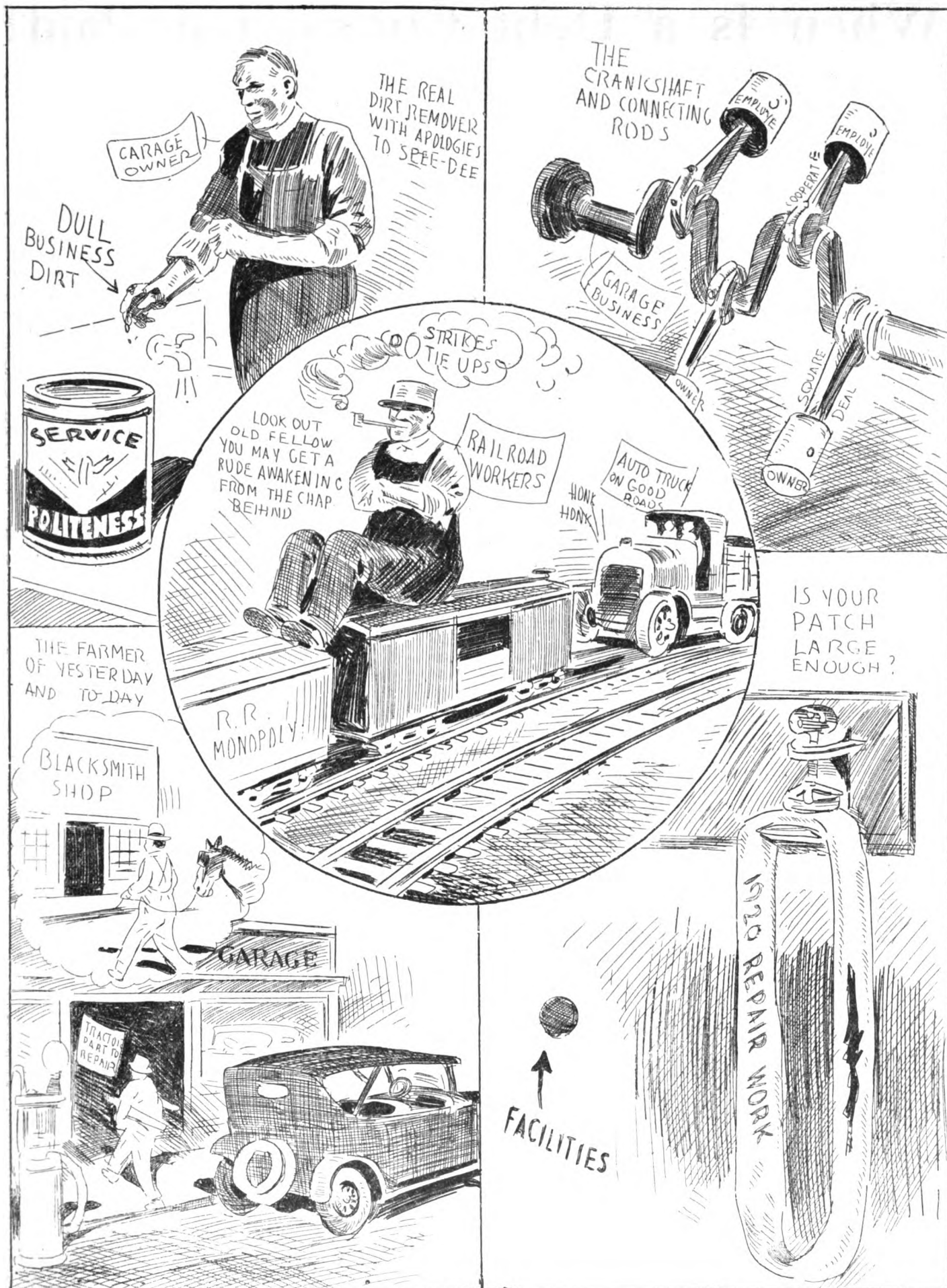
Or:

**YOUR CAR  
Looks as Good as the Top.  
We Dress Tops and Curtains.  
\$3.00.**

Fig. 4—Cards That Draw.

upon the percentage of the great army of moderately-priced cars."

Hardup Nut-Twister was no fool. He did not argue—he just tried what his friend suggested. He put his excess energy into whooping-up the side lines. He courteously reminded his customers of what they needed. They appreciated it and told others, and his business started uphill in high.



# When Is a Debt Considered Paid?

Sanderson Accepts Note on Debt of Customer—Debtor Goes Bankrupt—Problem Arises as to Whether Note Amounts to Payment of Debt—Lawyer Gives Some Pointers as to Negotiable Bill or Note Received on Account of Debt

By Chesla C. Sherlock

Business men do not generally stop to consider the legal principles involved in their daily transactions. The rush and hurry of our life, the common acceptance placed on certain transactions, and lack of interest are responsible for many of the tangles in which business men become involved.

Sanderson, at least, was "too busy" to stop to think of legal propositions, but one morning he asked the old question: "When is a debt considered paid?" And he asked it with extreme seriousness, for in the answer lay the question of whether or not he would lose a substantial sum of money.

It seems that Henry Smith had come into his garage some time before and purchased a bill of accessories on 90 days' time. At the end of the 90 days, Henry had walked in and asked Sanderson to accept his note for the amount due, and said note was made out payable in 90 days.

Sanderson demurred somewhat, hating to wait so long for his money, but upon Henry's assurances that it would be paid promptly when due, he took it. Within 30 days, it transpired that Henry Smith was in "hot water" financially. He had been forced into bankruptcy by his creditors and they were proceeding to strip him of his assets.

The problem facing Sanderson was: Did the note amount to payment of the debt? If it did, Sanderson had lost his right to proceed upon the debt at any time, and would have to wait until the note fell due before he could bring action under it. Naturally, that meant complete loss. The time to act in such cases is NOW, as everyone can appreciate.

That afternoon, Sanderson called on his attorney, Judge Davis, and put the proposition up to him.

"Smith claims that I can't do anything until the note falls due," he said. "Naturally, he wants to keep me and a number of others out now, because he is fighting the bankruptcy proceedings. He is trying to show that it is unwarranted, in view of the

small number of claims listed against him. If all the rest of us get in, it will knock the pins out from under that argument."

The old ex-judge went to his shelf and took down a volume marked "Ruling Case Law," and read therefrom:

"It is a well established rule that where a negotiable bill or note had been received on account of a debt, but without express agreement to ac-

.....  
● Business men learn something ●  
● new every day. So it was with ●  
● Sanderson when he sold some ac- ●  
● cessories on 90 days' time and ●  
● at the end of that period accepted ●  
● a three months' note to cover the ●  
● amount due him. ●  
● Before the three months were ●  
● up, the maker of the note was ●  
● forced into bankruptcy by his ●  
● creditors—and Sanderson then ●  
● found out what he had to do in or- ●  
● der to obtain his money on the note. ●  
● If he waited until the note fell ●  
● due, he faced a complete loss. ●  
● It's an interesting question and ●  
● one which may confront any gar- ●  
● age man or automotive dealer— ●  
● when is a debt considered paid? ●  
● .....  
.....

cept it as final satisfaction thereof, a recovery can not be had on the original obligation without a surrender of the negotiable paper, or a satisfactory explanation of its non-production, or unless it appears that it can not be enforced by a third person.

"The reason for the rule is not that the debt has been paid, but that a suit might afterwards be brought by the indorsee, and so the party might be compelled to pay the debt a second time."

"Now, if you will go to Smith and surrender the note, you can bring action on the original obligation in any way you see fit."

The judge scanned the balance of the page.

"Go on," said Sanderson, "if there is any more on the subject, I want to hear it."

"There is this in regard to payment of debts by check: 'There is no presumption that a creditor takes a check in absolute payment arising from the mere fact that he accepts it from the debtor; and giving a receipt (at the time) acknowledging payment of the debt when check is delivered, does not evidence an agreement to accept the check as absolute payment.

"Likewise an agreement that a check shall be in satisfaction of a note is not implied from the surrender and cancellation of the note. The surrender under such circumstances is conditioned on the payment of the check. And the marking of a note or mortgage as "paid" is not alone sufficient to constitute a check as payment.'

"Here's this in regard to accepting bank drafts as payment of debts: 'Bank drafts have come to be an important medium in the transaction of business, especially where large payments are made. They are regarded as safe and convenient. Under the improved systems of banking that now prevail, the confidence reposed in such drafts is very great.

"The presumption, therefore, that a draft of this character was received in payment is stronger than in the case of a note, check, or draft of a private individual, and the receipt of an unindorsed draft drawn by a third person will be presumed to have been received in payment of a debt of contemporaneous origin.'

"The law ordinarily does not consider a debt paid, Sanderson, until the creditor has received his money," concluded Judge Davis, "a note or a check is not money, but an order to pay or an acknowledgment in writing of indebtedness.

"If however, you expressly agreed to accept a note or a check as full payment or satisfaction, you are out of luck. You take your chances with the note or check.

"Bank drafts are the only 'pieces of paper' recognized by the courts as being in the same class as money, and even then the presumption may sometimes be overcome."



# How Trucks Increase Farm Efficiency

Anything That Adds to the Speeding Up of Production Adds Efficiency—  
A Farm Is a Business Plant and as Such Should Work for Profit Along the  
Same Lines as an Organized Business—In This Light Truck Is Indispensable

By H. T. Dobbins

The last time a statistical bulletin dealing with the distribution of motor trucks was published, it showed that more than 36 per cent of them were to be found on the farms of America. This percentage is steadily growing as experience demonstrates to the grain producer and stock grower that it is the most valuable adjunct to the marketing of their particular products that the ingenuity of men has produced.

Thousands of these trucks are to be found in the great corn belt of the Middle West. Here will lie the greatest market for truck manufacturers in the years to come because of the predominance of agriculture in that section, the great productivity of the soil, and the greatly added profits that speedy marketing brings.

The truck has solved the problem of that vast section of the West where branch railroad building stopped ten years ago, because the truck has not only made unnecessary and unprofitable tap lines of road, but it has brought every farm two-thirds of the way to town. It has done for the farmer in a marketing way exactly what the automobile has done for him in a social way.

Through the use of the automobile he can transact business and meet social engagements in a few hours and with no discomforts. Through the use of the truck he can reach his market town and get back home in half a day, even though 25 miles distant, where formerly it required the greater part of the 24 hours and left men and teams incapable of a day's work the following twenty-four hours.

It is an axiom of

engineering that anything that adds to the speeding up of production adds efficiency. Just as the tractor has added to the farmer's ability to plant, and other power ma-

stituted the truck for the horse, that more than 100,000 power wagons are in use on American farms—the managers have learned that it adds efficiency to operations.

Farmers take kindly to trucks in the first place because they have had experience with automobiles and they do not feel it necessary to devote time and money for mastering their operation. Truck-building, when the possibilities of the business dawned on the manufacturers, became simply a question of applying what experience had taught regarding automobile-making.

The engine of the truck represented no particular and costly experimenting. This was true also of the metal

parts. All that was needed was to make them heavier, and to readjust other things so as to make speed subservient to power.

The farmers had seen them working in the city streets before they first began to understand their value in their own work. When they began buying, they knew what it was they were purchasing and they knew the main facts necessary to running them.

So far as the farm is concerned, the truck performs but one essential task. It is a road machine pure and simple, not convertible into a home power-plant. It is worth

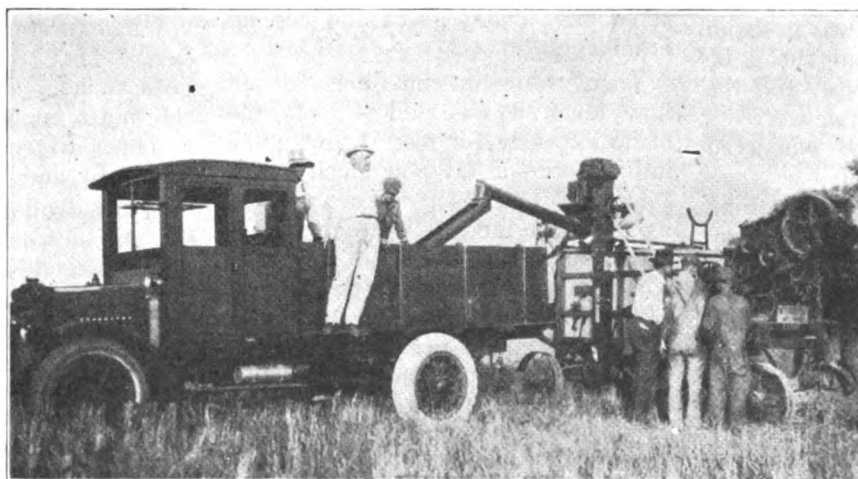
little unless it can save time for him. Time is getting to be more and more valuable. Many men who manage these plants received agricultural college educations, and their pay reflects the fact. Hired men are no longer available at \$15 or \$20 a month. They are getting from \$60 to \$80 a month. (Concluded page 38)



Type of Farm Truck in General Use in Marketing Potatoes, Shelled Corn and Other Bulk Farm Products.

chinery to harvest and thresh, so has the truck come to still further increase the efficiency of the farm by its time-saving in the matter of marketing. Most farms in the grain belt today represent an investment of \$25,000 to \$100,000. To justify the \$200, \$300 and \$400 an acre values that have been given this land by recent sales, it is necessary to treat it as a business plant, and work for profit along the same general lines as an organized business.

So it is for the same reason that manufacturers and jobbers have sub-



Loading Wheat Direct From Thresher for Transportation to Elevator.

# "Gosh its taim to be a bizness man"

"It Sounds Taim to Read a Book About Bizness, But if You Never Study Bizness Howre You Going to Get Ennywhere?—Are You Going to Be a Job Boy All Your Life?—Can't Get to Be a Milyunaire Without Stydyng the Job?"

By Frank Farrington

Dear Pete:

Hows everything in the drug bizness, Pete, and hows old Pinkvill getting along anyhow? Why dont you cum over sum sundie?

The other day I was out on an errend and I saw a grate croud around the frunt of a drug store window and I never miss ennything like that so I bored rite thru to the glas and what did I see? I saw a big oul in the window chaned to a post. Thats all.

Oh no, I cood see, besides, inside the store the man who runs the plase and he was smiling to himself and I kno what he was thinking. I aint a mind reeder but I cood see his brane working all rite.

He was thinking "Gee aint this grate? Sum croud Ime drawing. Bizness is fine." And all the time he wassent having enny bizness at all. He just thought a croud out there looking in the window was bizness.

Do you get me? There wassent a thing in the window, but the poor old oul and his post, and haf the peepel that saw him thought it was a shaim that a perfectly good oul shoold be shut up in a store window, and the other haf thought what a clever cuss the storekeeper was, and wundered what it was all about. But I gess noboddy thought of buying ennything and I diddent think about that then. I was one of the ones that thought the storekeeper was prettie clever to get sumthing that wood pull a croud.

I was telling Spike about it and he sed, "Yes a lot of fokes think they hav a grate window display when they hav sumthing there that draws a croud and they never stop to think whether it gets them enny bizness or

not. They work with their eyes shut."

I got to admit that when I saw all that croud I coodent get back fast enuf to tel Spike and if he haddent sed what he did I wood hav bin telling him to hurry and get an oul or sumthing that wood bring us a croud in frunt of his next window display of acksessorys. But I gess Spike is rite after all. We say Spikes window



"Gosh, it's taim to be a bizness man when Febo, the Iron Man, Cereal's just started."

displays sell the stuf even if they aint ouls.

Ive bin wanting a sqawker for my bisikkel for a long time and the other day I saw a good one in a store window. It lookt like a dandy and it was all nickel and shiney. It just suted me. Did I go in and buy it? I diddent.

There wassent ennything to tell how much it was and it lookt too blaim expensiv for me. I aint going into a store and say how much is that sqawker and then when they say its so much and I havvent got so much, say thank you and walk out. Not me. When I go after a thing Ime going to get it. Ime that way. But buleve me I aint going after it till Ive got sum ideeah how much it costs.

When I got back to the garaje I was asking Spike about it and he sed heed go in the store when he was go-

ing by and ask its price, but he sed, "Bill, theres a morrel to that insident. The morrel is alwys put the price on things in the window becaws if you dont you looze a sail. Aint it so?" And I had to admit it becaws there was a case right before me. And the price of that sqawker wassent ennything they needed to hide eether, for when Spike askt them it was so cheap that he bought it for me right off the reel.

And speeking of reels I guess Ime a grate hand for the mooveys. I kno all the skrene herohs and Ive got pictures of all of them in my rume. Wel, I got to talking to Bob last nite about mooveys. He never goze much and I tride to get him to go with me, but he sed, "Lissen to me Bill, how old are you?"

"Sixtene," I sed. "Swete sixtene—never bin kist—enuf."

"Cann the commidy," Bob says. "I want to see if I cant get an ideeah into your bene. You go to the mooveys 3 times a weke and there goze 33 cents dont they?"

I had to admit they did. And he says, "That aint the worst. There goze an hour and a haf for a 6 rele sho and a cuppel of hourse when its a sooper feetcher. 2 hours is worth to you by and by a dollar at leest."

"How dyou get that way?" I sed, "by and by a doller?"

"Its like this," sayz Bob. "What you cood lern in 2 hours now, enny 2 hours wood be worth to you more than a dollar sum day. Your out about 3.33 a weke."

"That dont leev me much," I sed. "Ime glad it aint as bad as you maik it."

(Concluded on page 42)

# Motor Fuel Production, Distribution

Production and Use of Gasolene—Its Physical and Chemical Properties and Quality in Recent Years—Present Tendencies in Development of Substitutes—Published by Courtesy of The Journal of The Franklin Institute

By E. W. Dean, Ph. D.,

*Petroleum Chemist, Bureau of Mines, Pittsburgh, Pa.*

One of the important factors in our present system of transportation is the use of vehicles propelled by internal combustion motors. The use of automobiles and motor trucks has developed to such a stage that they may be regarded as practically indispensable and people in general are looking forward to wider use of this type of mobile equipment rather than anything in the line of restriction. The fuel upon which these motors are dependent is, however, one that is obtained from a raw material which is drawn from comparatively limited natural resources.

The term "motor fuel" is a broad one designed to include a wide range of products capable of furnishing power in internal combustion engines. At the present time, however, "motor fuel" actually means gasolene, a product principally derived from crude petroleum. The production of crude oil has increased steadily throughout the period of years during which the automotive industry has been developed, but the rate of increase has been relatively small.

The production of gasolene has increased much more rapidly than the production of crude oil, but even this has not been comparable with the growth of the use of motor-propelled vehicles. Consequently a real problem exists in the matter of conservation of petroleum-derived motor fuel and the Bureau of Mines is endeavoring to promote measures favorable to more efficient production and is also working indirectly toward the development of satisfactory substitutes to be used in place of the present types of gasolene.

The material covering this subject has been divided under four general heads:

First, information regarding the production and use of gasolene.

Second, information regarding the marketing of gasolene.

Third, information regarding the physical and chemical properties of gasolene and the quality of the products marketed in the calendar years 1917 and 1919.

Fourth, information regarding present

tendencies in the development of substitutes for gasolene.

The first and second heads are taken up this month, while the third and fourth heads will be discussed in next month's issue.

## Production and Use.

Before discussing the production of gasolene, it seems necessary to attempt some sort of definition. This is not an easy task and the following statement, taken from the 1916 Webster Dictionary, is hardly adequate for present purposes: "Gasolene; a volatile, inflammable liquid used as a solvent for oils, fats, etc., as a carburetant and to produce heat and motive power."

The author is venturing the following

The oldest, and even at present the most important, method of producing gasolene is one involving distillation from crude petroleum. This method is frequently called the "straight refinery" process and gasolene produced by it is termed "straight refinery" or "straight run" gasolene.

## Methods of Production.

The basic process is that of fractional distillation, which involves separation of products having different ranges of boiling points. The process, as conducted in commercial practice, varies in a great many details and a discussion of these variations is beyond the scope of the present paper. The following brief description covers perhaps

the most common general procedure:

Crude oil is distilled in cylindrical, horizontal stills which are heated either by coal or oil. The vapors pass through condensers and the liquid products are run into receiving tanks.

The product separated from the crude oil by this primary distillation is in the refinery generally called "crude naphtha" or "crude benzine." The next process of treatment is usually a chemical one which is principally intended to improve the color and odor of the product. Crude naphtha is pumped into lead-lined agitators and is there

treated, first with sulphuric acid, then with caustic soda solution, and finally with water. The stirring is usually accomplished by blowing air in at the bottom of the agitator tank.

The final process in the refining of gasolene is a redistillation of the chemically treated crude naphtha. This distillation is generally carried out in so-called steam stills. Steam stills sometimes are heated entirely by closed steam coils, sometimes partly by fire while live steam is blown through the hot liquid. Steam stills are generally, though not invariably, equipped with fractionating towers and are often operated in batteries which permit continuous rather than "batch" distillation. Fig 1 shows, in the foreground, steam stills of the type in which heat is supplied by closed steam coils. It will be observed that these

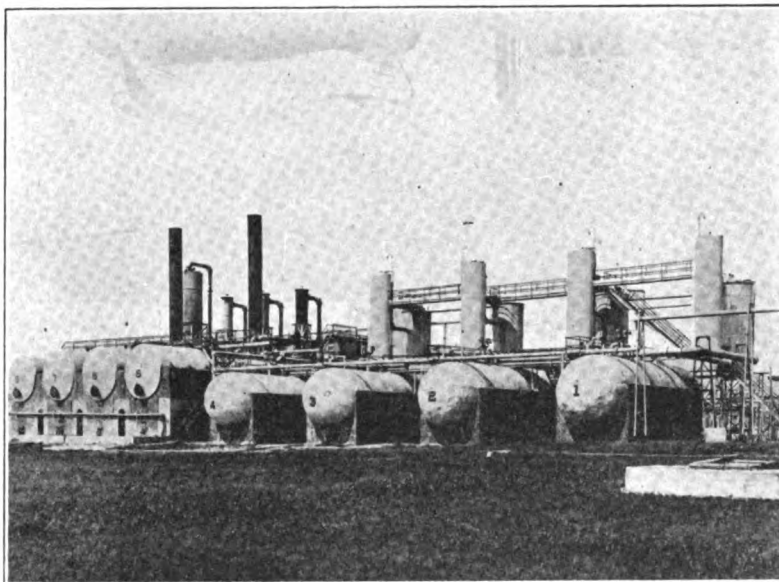


Fig. 1—Steam Stills for Redistillation of Gasolene, Cosden & Co., Tulsa, Okla.

definition as covering the present understanding of the word: "Gasolene is an inflammable, relatively volatile liquid, derived from crude petroleum or similar in properties to petroleum derivatives, and containing a sufficient proportion of low-boiling constituents to permit the starting of an internal combustion motor under moderately unfavorable conditions."

The principal reason for venturing this definition is to permit the making of a distinction between the words "gasolene" and "naphtha." Naphtha is a petroleum product that is generally, though not invariably, less volatile than gasolene but which is chiefly distinguished by a lower content of low-boiling fractions. In other words, naphtha is gasolene minus the major portion of fractions distilling below the boiling point of water.

stills are equipped with large fractionating columns.

The properties of the gasolene produced by the straight refinery process are subject to considerable variation and are controlled in part by the physical and chemical nature of the crude oil from which it is derived and in part by the procedure employed in the refinery. Straight refinery gasolene is composed chiefly of so-called saturated hydrocarbons; that is, hydrocarbons which are not chemically active.

Most of the chemically active products which may be present in the crude naphtha from the primary distillation are removed by chemical treatment with sulphuric acid. The property chiefly controlled by the refining process is the "end point" or upper boiling limit of the gasolene, which is fixed so as to separate the more volatile fractions from those generally marketed as kerosene or lamp oil.

#### "Casing-Head" Process.

A considerable proportion of the present supply of motor gasolene is derived not from crude petroleum but from natural gas. Gasolene from this source is commonly called "casing-head gasolene," due to the fact that before its commercial separation was in vogue, it was discovered as a condensate around the heads of well casings. Natural gas frequently contains appreciable quantities of liquid hydrocarbons which, although of relatively low-boiling point, can be readily separated. Two types of process to effect this separation are in general vogue, the older, and perhaps still the more important, being the so-called compression process.

This process is usually operated according to the following general scheme: Natural gas is compressed under a moderate pressure and then cooled. Subsequently it

passes through a second set of pumps which brings it up to a high pressure. Cooling after this second compression effects separation of the liquid hydrocarbons. This type of process is used only for natural gas

naphtha is used as the absorbent, a product is obtained from the absorption towers that is usually marketed without subsequent treatment. If a more efficient absorbent such as so-called straw oil or mineral seal oil is employed, the casing-head gasolene shows one of the first plants operating the absorption process.

Casing-head gasolene produced by the compression process is somewhat more volatile than that produced by the absorption process, but either product has too high a vapor pressure to permit safe handling or transportation. The usual practice is to blend this gasolene either with naphtha or with high end point gasolene, after which it can be shipped and handled with a reasonable degree of safety. Casing-head gasolene blends were unfavorably regarded by users when first put on the market, but this was due more largely to improper methods of blending them than to any inherent bad qualities of the product.

The blended casing-head gasolene now marketed is probably more satisfactory in use than the so-called straight refinery gasolene of equivalent average boiling point, this on account of its greater ease in starting a cold motor. Statistics have shown that approximately 10 per cent of the nation's supply

of gasolene is of the casing-head variety and due to the necessity and desirability of blending with less volatile petroleum distillates it is probable that the proportion of marketed gasolene, containing products from natural gas, is several times this figure.

Another recently developed method of producing gasolene is the so-called cracking process which has received a considerable amount of publicity during the past few years. The basic principle of the cracking process is one with which all chemists are familiar; namely, that if organic compounds are heated at sufficient high temperature, they decompose with the formation of other compounds, a large percentage of which are of smaller molecular weight and lower boiling point. The cracking process has been used in the petroleum industry since the early days of its development, chiefly for the production of kerosene from the higher boiling fractions usually classed as fuel oil.

This older process was conducted at atmospheric pressure. It appeared, however, that satisfactory yields of gasolene could not be obtained under these conditions as the hydrocarbons from which it is derived

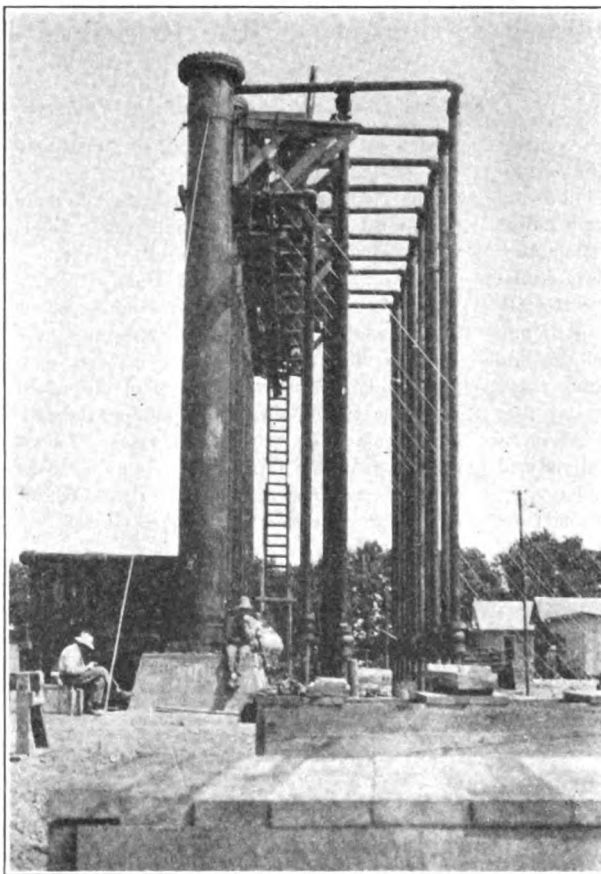


Fig. 2—Casinghead Gasolene Absorption Plant, Ohio Fuel Supply Co. Homer, Ohio.

of a relatively high gasolene content.

The other process is the absorption type which involves washing the natural gas with either a heavy naphtha or a high-boiling petroleum oil, thereby dissolving out must be separated by distillation. Fig. 2 the bulk of the liquid hydrocarbons. When

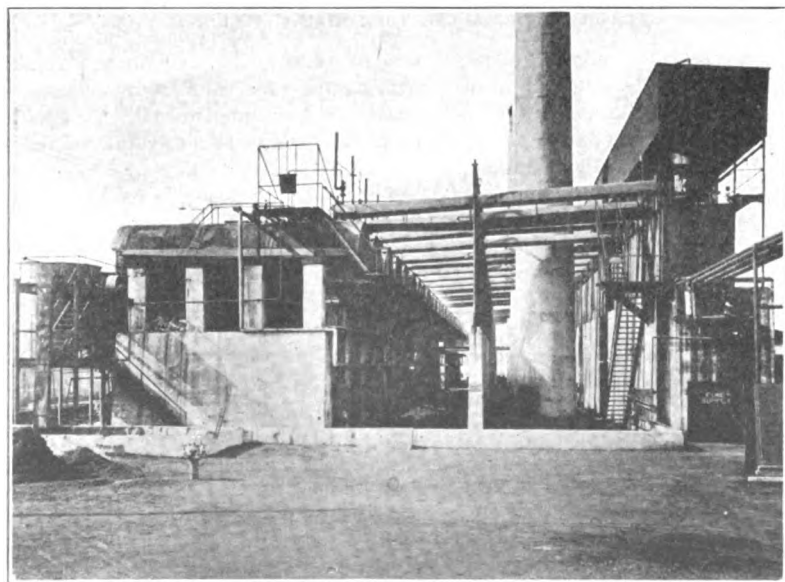


Fig. 3—Burton Gasolene Cracking Stills, Standard Oil Co. of Kentucky, Louisville, Ky.



tended to vaporize before decomposing. In order to produce gasolene by the cracking process, it is necessary to maintain the distillation system under pressure, thereby permitting the attainment of a high temperature before vaporization occurs. Cracking has also been effected by the scheme of passing liquid or vaporized oil through superheated tubes.

Numerous types of gasolene-cracking

is also interesting to note certain seasonal factors which have to do with the production, consumption and storage of gasolene.

The increase in production of gasolene during the last few years is shown by the figures in Table 1. Assuming that the average refinery price of gasolene during the year 1918 was 18 cents per gallon, it appears that the total value of the year's production of motor fuel is approximately \$650,000,000.

An interesting relation may be observed by comparing the increase in production of crude petroleum and gasolene and the increase in number of cars and trucks in use in the country. Fig. 4 represents these increases, on a percentage basis, the 1909 figures being regarded in each case as the

basic ones. It will be noted that during the 10-year period the production of crude oil from wells in the United States increased by about 95 per cent, the production of gasolene by approximately 560 per cent, and the number of cars in service by over 1,700 per cent.

These figures bring out certain important facts. The production of gasolene has increased at a notably greater rate than has the production of crude oil. In 1909 the yield of gasolene from the crude refined was 10.7 per cent, whereas in 1919 the yield was 26.1 per cent. This increase in the relative amount of gasolene produced from the crude is accounted for in several ways. In the first place, the distillation range of gasolene has been notably changed, prod-

Production of Gasolene		
Year	Barrels	Gallons
1909.....	12,900,000	541,800,000
1916.....	49,020,967	2,058,880,614
1917.....	67,870,153	2,850,546,426
1918.....	85,007,451	3,570,312,942

Table 1—Annual Production in United States.

processes have been developed, some of the pressure-distillation type, others of the tube type. At present the pressure-distillation type is the only one that has been developed on an important commercial scale. The process most commonly used is that of Burton, which was developed by the Standard Oil Co. of Indiana and which is operated by this company and by various others, mostly of the Standard group.

Figures now available have indicated that approximately 10 per cent of the nation's supply of motor fuel is derived from cracking processes. Cracked gasolene is similar to straight-run gasolene as regards physical properties, but there is an essential chemical difference due to the fact that the cracking reaction produces a considerable percentage of olefin or unsaturated hydrocarbons.

Cracked gasolene is usually marketed in the form of mixtures with straight refinery and casing-head gasolene, these mixtures rarely being more than 12 per cent, unsaturated, which indicates that the products of the cracking reaction are blended with at least an equal amount of casing-head or straight-refinery gasolene.

Fig. 3 shows a battery of Burton stills. These stills are distinguished from the more common types of refinery equipment by the fact that they are operated under pressure and that they are equipped with special types of fractionating towers.

#### Statistics.

Statistical information is frequently uninteresting and unless figures are carefully interpreted it may be misleading. As regards the production and use of gasolene, however, the information now available is so definite and impressive that misunderstanding is practically impossible.

In the present connection it is interesting to present data regarding the magnitude of the nation's production and consumption of gasolene, the relation between production of gasolene and production of crude oil, which is the principal raw material from which it is derived, and the relation between production of gasolene and the magnitude of the most important outlet of consumption, which is the automotive engine. It

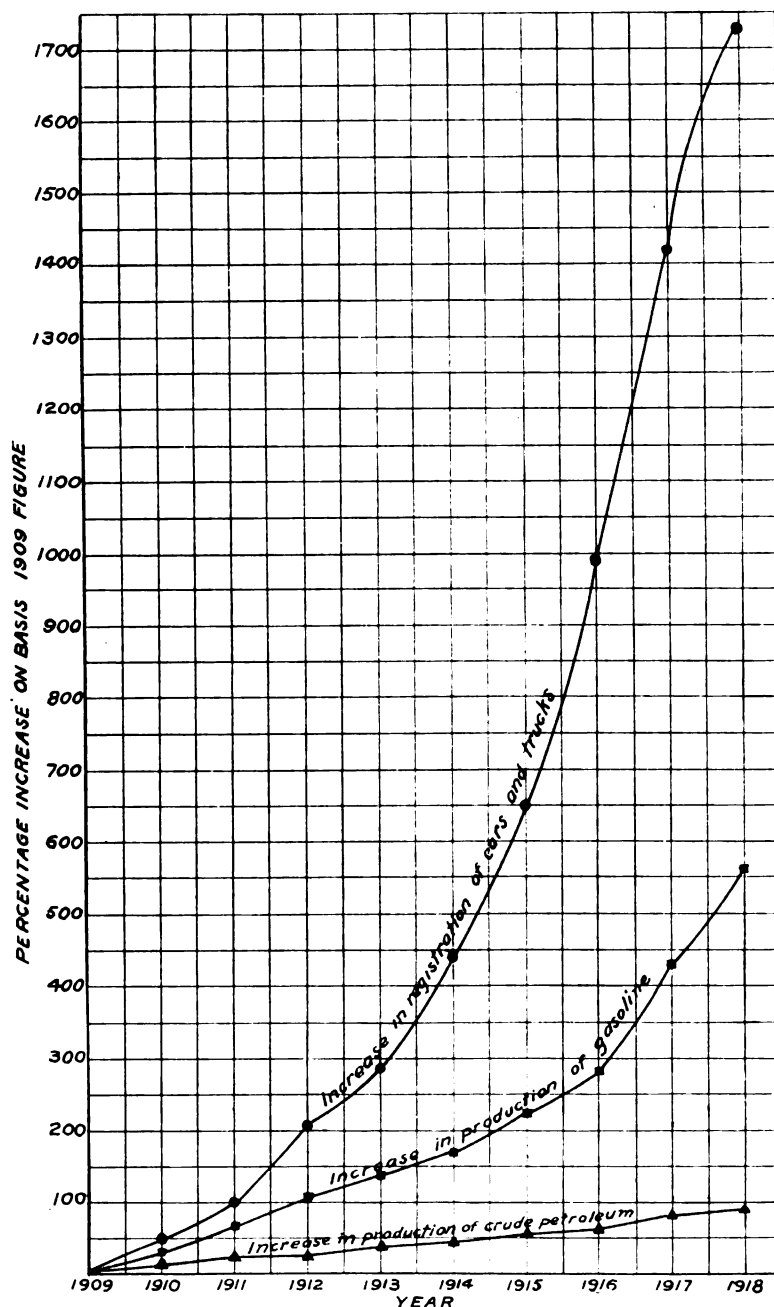


Fig. 4—Relative Increases Since 1909 in the Production of Crude Petroleum and Gasolene and in the Registration of Motor Cars and Trucks.

ucts now on the market being of considerably higher average boiling point than those in 1909.

The production of casing-head gasolene and the use of cracking processes have been important factors in increasing the apparent yield of gasolene from crude oil. In addition there undoubtedly have been increases in the efficiency of the conventional types of refinery equipment such as crude stills and steam stills.

It may be noted, also, that the average quality of the crude oil produced in the country has probably improved as regards gasolene content. It is a question as to how near the present percentage of gasolene production per unit quantity of crude oil approaches the maximum that is commercially practical. It is impossible to make predictions regarding the future quality of crude oil. As regards efficiency of refinery equipment, it has been estimated that this may be improved on the average by a maximum not over 10 per cent.

The production of casing-head gasolene undoubtedly has not reached a maximum but here again it is difficult to attempt an estimate. The use of cracking processes certainly has not developed to the maximum possible extent and the author has in the past ventured to predict that the quantity of gasolene produced from the crude could, if desired, be practically doubled if maximum use were made of this means of production. These estimates have not been strenuously contradicted, but the author is frank to admit that his own optimism has decreased considerably since they were offered.

It is still believed that the use of cracking processes could double the production of gasolene, but it appears that this is not likely ever to be accomplished as there is a marked tendency for increases in the use of fuel oil, which is the product that must necessarily be sacrificed in case maximum production of gasolene is attained through cracking. It is now believed that the chief limiting factor for the use of cracking processes is likely to be the demand for fuel oil.

As regards further increases in the end point of gasolene, considerable doubt exists. Many authorities in the automotive industry claim that the present limits are too high, although this probably means that they are too high for the types of engines that can and will be developed in the reasonably near future. The present considerable demand for kerosene indicates, moreover, that further changes in the quality of gasolene are not likely to occur in the immediate future as raising the end point of gasolene inevitably decreases the production of kerosene.

The fact that the number of cars in service has increased approximately three times as much as the production of gasolene is a fact meriting serious consideration. Although exact data on this point are not available, it is not believed that the average

consumption of gasolene per car has notably decreased. The obvious inference is that in 1909 the percentage of gasolene used by automotive vehicles was considerably smaller than the percentage so used in 1918. Inasmuch as the use of gasolene and naphtha for other purposes than internal combustion engines is increasing rather than decreasing, it is entirely reasonable to believe that at no very distant time the demand for gasolene is likely to exceed the supply unless the producers of gasolene add to their already considerable accomplishments in production, or unless the fuel efficiency of automotive equipment is considerably improved.

It is realized that the production of gasolene during the present calendar year (1919) has been slightly in excess of consumption, but this is readily accounted for by the fact that the petroleum industry increased its volume of production during the war, whereas the manufacturers of automobiles and trucks have not yet gotten back to pre-war operating efficiency.

Aside from statistical evidence indicating the necessity of conservation, it is interesting to observe certain facts regarding the seasonal variations in production, consumption and storage of gasolene. As regards the production of gasolene, it may be observed that there is a slight seasonal fluctuation, refineries working at greater efficiency during the summer than during the winter months. The consumption of gasolene varies notably, due to the fact that automobiles and trucks are less extensively used in cold than in warm weather. The quantities of gasolene stored naturally vary in the opposite direction, the stocks at the refineries increasing during the winter months and decreasing during the warm weather.

It is of particular interest to note that stocks of gasolene reached an abnormally low mark during the late summer and early fall of 1918, there being at this time less than one month's supply of gasolene in reserve. This condition was what caused the regulation prohibiting the use of motor vehicles on Sundays during a period of several weeks. As regards the quantities of gasolene in storage, it is interesting to observe an unusual situation for the present year (1919). Maximum stocks of gasolene are usually in storage in the early spring, which was the case in 1918. In 1919, a maximum was not reached until May and no important decrease in stocks occurred until July. In July of 1917 and July of 1918, stocks were at a considerably lower level than in July, 1919.

#### Marketing of Gasolene.

The marketing of gasolene is a subject that is of particular interest but does not, however, permit satisfactory discussion by a chemist. The following observations are presented with a certain degree of qualification. The author feels that the basic data are reliable but does not guarantee his interpretation in all cases. Gasolene market-

ing practice obviously is not controlled by any simple physical and chemical laws and any general tendencies that may be noted are principally emphasized by exceptions.

The marketing of gasolene generally involves jobbing and retailing organizations which handle the product after it is delivered by the producer. In some cases the three organizations—producing, jobbing and retailing—are entirely distinct, in others they are controlled and operated by a single company. Likewise, there are cases where two are under the same general control and the other is separate.

As a general rule competition in the retail end of the business is practically unrestricted, producing and jobbing companies selling gasolene freely to independent competing organizations. There are certain exceptions to this and it may be noted that in several cities in the Middle West, that the retail price is the same as the jobbers' price, which eliminates any profit for the independent retailer who tries to meet the general figure for the locality. This is not, however, a particularly serious matter as the retailer's profit is always small and frequently does not cover losses and the cost of handling. The usual margin is two or three cents a gallon, which is about 10 per cent of the selling price.

In general the small retailer handles gasolene chiefly for the purpose of attracting or retaining customers who purchase other commodities yielding a larger margin of profit. The larger filling stations probably make a fair profit on gasolene, although even here it is safe to assume that the really profitable branch of business is the sale of lubricating oil and occasionally other automobile accessories. It may also be mentioned that the system of retail distribution of gasolene is very highly organized and that customers receive service which is claimed to be the best maintained in any line of business. The author is frank to admit that with the possible exception of tobacco he does not know of any commodity which is as generally available and efficiently dispensed as gasolene.

As regards the price of gasolene, there are no general rules which can be stated without bringing to mind a host of exceptions. The one generally recognized fact is that the jobber's price is generally that fixed by the larger marketing organizations. What actually determines the prices selected by these organizations is something which can be determined only in a very general way and the chief point of importance to the general consumer is that competing organizations generally favor an upward rather than a downward revision.

The most important general factors regulating the price of gasolene are the costs of transportation from refining centers and the demands of customers as regards volatility range. Gasolene marketed at a considerable distance from centers of supply is more expensive than that marketed in ad-

(Continued on page 48.)

# Farewell to the "Free Air" Pest

Like Many Other Luxuries Granted Free, "Air Stations" Have Not Been Appreciated—Crowd Keeps Away Customers Who Want Repairs, Oil and Gas  
—Cincinnati Finds Panacea for Trouble in Automatic Air and Water Service

By Felix J. Koch

Once upon a time—really quite a few hundred years ago, the wiseacres in such things tell us—someone wrote the tale of a certain camel that has since become world-renowned.

This camel, it appears, had driven his master faithfully and well upon his errand, had helped him on his way, as best it could. Then, lo, a great sandstorm came up, as sandstorms will, on the desert, and while the great beast might have closed its eyes and turned to breast the storm, Dame Nature having equipped it to just this end, it suddenly preferred to put its nose beneath the master's tent-flap.

Being a kind-hearted fellow and, incidentally, believing the camel might reciprocate favors, in gratitude, the man let the beast have its way. First the sensitive tip, then the whole nose, came in; then the head; then the neck—and, by and by—but, Reader Friend, you know, very well, all the rest!

Now, similarly, once upon a time—and it's not over a decade or two past—in most parts of the American Union, an enterprising someone came along with the suggestion that American automobile garages, American mechanics' shops doing automobile work, among other things, and American automobile supply and oil supply stations might do very well by supplying patrons with free air.



A "Free Air" Station Closed.



Sign of Automatic Air and Water Service.

There is nothing so cheap in the world, it appears, as air; so why not give air away? Why not, rather, save Jack Roosa the bother of getting out the hand pump, screwing its messy hose to the little grimy plug on the tire, and then pumping away 'til his shirt fairly drips with perspiration; 'til his face is flushed; his hair matted and, worst of all, he is tired and out-of-sorts for the rest of the day? Surely Jack would appreciate a service that would save him this, the giant bugbear of riding forth in the much-beloved automobile.

Wherefore, at no slight expense indeed, air-compressors were put into the various garages, filling stations, automobile repair shops, so on, and the sign "Free Air," has become so commonplace that we rather take it for granted everywhere.

Now, however, this, like many another boon which was suddenly granted people freely, we no longer appreciate. But the camel is actually coming to tear down the owner's house. Again and again, and yet again, and still again, Jones and Brown and Smith and Johnson make a practice of driving to the first handy garage, solely to get free air. Absorbing free air becomes a habit.

These people have a regular concern, perhaps near their home, or near the car owner's place of business, to which they entrust the car for regular repairs. Obviously, *when there*, they have the tires filled with its free air—but, *there* is often many, many miles from the routes they tour at other times.

These people give some great oil or gasoline concern standing orders to stop in, weekly, and fill the tanks with gas, with oil; with "dope," or grease, that they need not be bothered with that. They have a charge account at some automobile store away down in town, and telephone for any other needs—and when they drop in for free air, really and truly, there isn't a thing they could buy!

Again, the air is cheap, so why not give a hungry tire air, even as you would a thirsty passer-by a cup of cold water, or a hungry man a piece of bread from your laden larder?

In perfect droves these automobiles come to the free-air place, notably in the hours when business men go to or from work, when milady rides to shop or call, and, again, on Sundays. They fill the drive to the free-air hose—they crowd the street leading to it, awaiting their turn for "free air."

Along now comes the man who would buy gas, or oil, or stop to have the garage investigate that knock in the car,

(Concluded on page 42)



Interior of a "Free Air" Station.

# Welding, Cutting and Brazing Practice

In View of the Tendency of Garagemen to Handle Tractor Repairs, the Brazing of Tractor Parts Is Taken Up—The Article Has a Double Significance in That It Concerns Brazing as It Is Done with the Oxy-acetylene Torch

By David Baxter

There seems to be an ever-increasing tendency on the part of motor car dealers to combine the tractor and automobile business. That is, the automobile dealers are now commencing to include the sale of farm tractors with their car agencies. In fact, some are already doing almost as much business in the tractor line as they do in the automobile line, and the up-to-date dealer who operates a garage and repair department in connection with the sales-room, is already preparing to handle tractor parts and do all kinds of tractor adjustments and repairs.

This requires but little preparation, however, since the same machinery and tools employed in automobile repairing, with but few changes or additions, may be used to repair farm tractors.

The growing inclination on the part of car dealers to enter the tractor field is but a natural result of their position. They are the logical ones to demonstrate the abilities and possibilities of this new mode of applying mechanical power. They have every facility for so doing, since a tractor is really an automobile insofar as the application of power is concerned, and their opportunities for selling are the greatest, if statistics are reliable. It is claimed that farmers now own about 70 per cent of the automobiles. The dealer's acquaintance must, therefore, be large among the men who will buy the farm tractors.

The dealer who operates a garage with a well-equipped repair department, will be doubly fortunate, since he can then get the most of the repairing of tractors he sells; not only the battery, magneto, oil service, and minor adjustments, but he can handle piston boring, bearing, and crankshaft work, and, if he owns an oxy-acetylene welding outfit, he can repair most of the broken castings and worn parts.

In fact, there is scarcely any kind of repairing about a tractor that the torch welder cannot do; all of which argues for the installing of a welding and cutting torch in every garage repairshop, particularly those that handle or contemplate the



Fig. 1—A Special Home-made Tip for the More Difficult Brazing Jobs.

handling of the tractors used by farmers.

In view of the tendency just outlined, the writer believes it is well to incorporate in the Welding, Cutting and Brazing Department of THE AMERICAN GARAGE &

AUTO DEALER an article now and then on the subject of repairing tractors. Inasmuch as we have lately been chiefly discussing the subject of welding, this article will have a double significance in that it concerns brazing as it is done with the oxy-acetylene torch, so that even though the reader is not at the present time particularly interested in tractor repairing, he may still benefit by the information presented concerning brazing.

The different jobs of brazing are so nearly alike that it has seemed inadvisable to run very much of this class of material in this department. However, the job discussed herein embodies several difficulties not always found in brazing work, so that even the experienced torch operator will find the discourse helpful.

In one sense of the word, this might be called a welding job since the welding torch was employed, but the edges of the fracture were not fused together as is customary in welding. They were merely covered with a layer of bronze filler metal which made it not strictly a welding job. The thinness of the metal made the welding together of the two sides of the fracture next to impossible, and as this was not necessary, the fracture was brazed.

Brazing with the oxy-acetylene torch differs from welding in one way, in that the part or parts to be brazed are not melted to a fluid state in the fracture, and even though this is done, the melting is not more than skin deep. In other words, the place to be brazed is not melted below the surface; just a thin skin of the surface is heated to or near a melting condition and this never white hot and fluid.

No attempt is made to melt and mix the sides of the fracture with the filler rod. The main endeavor is to get the filler bronze to adhere firmly to the surface of the part being brazed. This is another way that brazing differs from torch welding. In many instances, brazing is merely a make-shift repair, not to be compared with welding.

When compared with oxy-acetylene welding, however, the brazing process is very simple. No great amount of skill

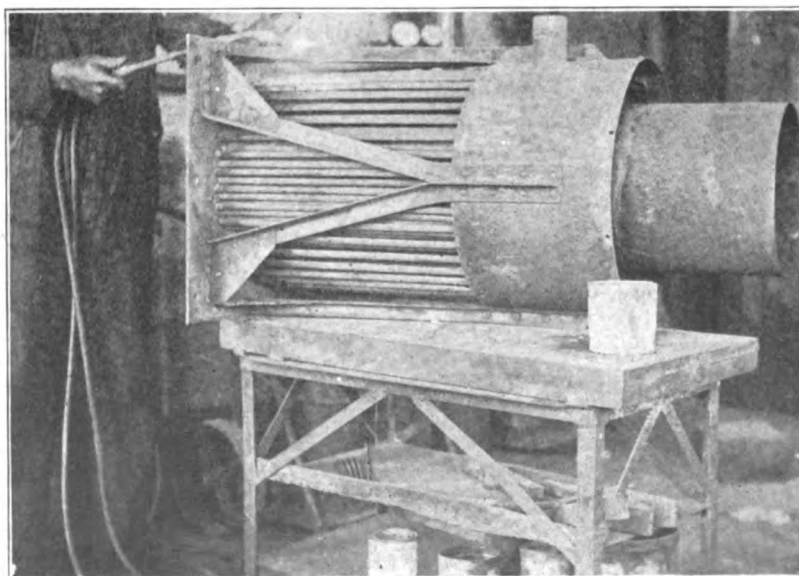


Fig. 2—Difficult Brazing Job on a Water Cooler of a Farm Tractor.



in torch practice or any of the usual precautions that are so essential to successful welding in regard to preheating and re-heating, are required. Although lots of brazing jobs require considerable ingenuity on the part of the torch operator, he is often obliged to invent little devices and appliances on the spur of the moment, as it were, in order to overcome some of the obstacles.

The necessity of constructing such a device was perhaps the most difficult part of the brazing job illustrated herein. That is, the job seemed quite impossible until the welder hit upon the idea of making a special torch tip to fit the work. It was, in a manner, impossible to braze the thin copper tubes with an ordinary welding tip, due both to the locations of the fractures and to the thinness of the metal tubes. In the first place, the cracks in the tubes were not in reach of the welding flame as it came from a standard tip and there was great danger, owing to the thinness of the copper of melting or burning holes through the tubes.

Fig. 1 shows the special brazing tip that was evolved in order to permit the welder to reach all parts of the damaged tubes. Note the slenderness of the tip, also the curved shape of it. This shape permitted the operator to reach any side of the cracked tubes. By simply giving the curved tip a quarter or half turn, the operator was able to braze cracks from almost any angle. With this special tip, he could apply the point of the flame to any desired spot without danger of melting adjoining tubes.

This special tip was made of a piece of copper tubing welded to a discarded welding tip. The flame end of this tip was filed almost to a point and forced partly into an end of the copper tubing, care being taken to see that neither the hole in the welding tip, nor the hole in the tubing, was clogged. Then the tubing was made solid and air tight by building a fillet of bronze around the joint.

The outlet end of this special tip was then hammered together so that a new hole of correct size could be made in it. This was accomplished by slowly filing a notch in the closed end of the tube. As soon as the file cut through the solid end into the inside diameter of the tubing, the tip was tried out on the torch. After several trials, the proper outlet was attained. Then the tip was ready for use.

Before describing its use, however, let us examine the job to see what was required and what was to be done to facilitate the brazing process.

Fig. 2 illustrates the job clearly enough so that only a brief description will be required. This device was a water cooler for a familiar type of farm tractor. These copper tubes are approximately 1/16th of an inch thick and about one inch in diameter, and are located about an inch apart, one ring of tubes off-setting the other. Their

proximity made it impossible to manipulate the standard welding tip between them, and their small diameter make it impossible to weld the cracks or leaks from the inside of the tubes.

The thinness of the walls was also a factor in preventing welding. Therefore, the only way to repair the leaks, which consisted of cracks from an inch to several inches along the sides of the tubes, was to construct a special tip for the welding torch, as just described, which could be inserted between the tubes. Even then, it was necessary to be very careful not to burn through the sides of the tubes with the small flame obtained by the use of this special tip.

Instead of melting into the tubes as in welding, patches of filler metal were merely stuck to the surface of the tubes along the cracks. Before starting to braze the tubes, however, each crack and a portion of the metal in its near vicinity was thoroughly scraped and cleaned until the bright copper

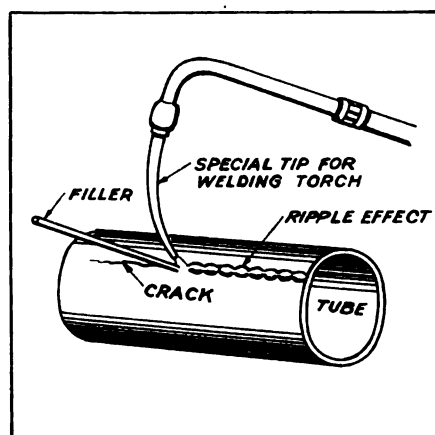


Fig. 3—A Form of Ripple Brazing.

was exposed. This was done to prevent any oxide from interfering with the molten filler. The naked metal furnished a better surface to which the bronze filler could adhere.

Previous to cleaning, the tubes were corroded or oxidized by the action of the air and by water due to the leakage. To attempt to do the brazing without first removing all of this deposit would have meant considerable trouble in getting the bronze to stick to the tubes.

In preparing the tubes for brazing, no attempt was made to groove out the cracks as is usual on many brazing jobs. First, the metal was too thin and then the lack of working space forbade it. The only preparation for brazing then, aside from cleaning the leaks, was to place the apparatus in a position where the tubes would be horizontal during the brazing process. Vertical brazing is quite simple when compared with vertical iron welding, but it is easier to do better work if the job can be arranged so the part to be brazed is horizontal, because there is then no tendency of the filler metal to overflow and drip back on the finished bond.

A standard, neutral welding flame is no doubt the safest one to employ in brazing, but a slightly reducing flame can be used with impunity if the operator is careful about manipulating the torch. This reducing flame carries a slight excess of acetylene and is, therefore, less powerful than the neutral flame. The temperature is lowered by the over-supply of acetylene gas, thus there is less danger of burning the metals, especially thin metal as used in these tubes.

Where the acetylene gas in the welding flame exceeds the oxygen, there is less danger of oxidizing the molten metals. Practically all of the oxygen is consumed by the acetylene and, therefore, cannot be forced through the flame into the melting metals. The latter is probably the main reason for employing the excess acetylene flame. This flame is often recommended merely in order to make sure that there is no excess of oxygen in it, since it is oxygen that plays hob with brazing in all kinds of work.

A slightly reducing flame was utilized to braze the tubes in the job discussed herein. The point of it was applied to one end of a crack and at the same time to one end of a bronze filler rod. Both were heated, but most of the heat was applied to the rod. The flame was moved in a circle over the end of the filler rod and an arc of the crack, the movement being timed so the drop of filler at the end of the rod would be melted when the portion of the leak was ready to receive it.

As soon as a very thin skin of the tube metal started to melt, the molten filler was applied. This application was in the form of a twisting dabble, which served to spread it over the melting surface of the tube as soon as the filler rod melted. Meanwhile the flame and filler were gradually moved to another portion of the crack where the filler and tube were once more treated and united by the deft manipulation of the filler rod.

The crack was covered with filler bronze from end to end in a series of ripple-like ridges. These ripples were formed by the dabbling and twisting motion of the rod.

Each one of all the cracks was repaired in a like manner, one after the other, by rolling and tilting the job to bring the cracks to a horizontal welding position. No attempt was made to make the joint smooth and level, but a surplus of metal was added to each leak. Fig. 3 indicates a form of ripple brazing which was approximated, in this instance, as near as the working space permitted.

A brass filler rod could have been employed, but a bronze one was used on all the leaks, its diameter being 1/8th of an inch. The lower melting point of the bronze was the more convenient with which to braze the copper. This lower melting

(Concluded on page 30.)

# Accounting:

Shop Practice as Followed in One of the Largest and Most Progressive Ford Agencies Is Explained—Method of Handling Labor Situation to Assure Work of Quality, Salary Basis, Shop Work, Repair Forms and Car Ledger Leaf Described—Readers' Criticisms and Suggestions Welcomed

By J. Newton Boddy

Mgr. System and Loose-Leaf Dept., Jeffrey & McPherson Co., Minneapolis

We are indebted to Mr. Sturr of the Sturr-Bullard Motor Co., Minneapolis, Minn., for the bulk of the current article on shop practice. The Sturr-Bullard Motor Co. operates one of the largest and most progressive Ford agencies in the Northwest and can be accepted as an authority on Ford agency machine shop practice.

As the Ford shop system of standard prices for standard operations is so well known in all the larger Ford agencies where it can be successfully operated, we will only touch on it by presenting for consideration the repair order forms. We will be glad to take up in detail any point or points of the standard Ford system with any subscriber who may request information.

The outstanding feature in the Sturr-Bullard organization, to my mind, is its unique method of handling the labor situation and obtaining the loyalty of their shop workmen. The Sturr-Bullard company guarantees every mechanic a living wage—the Ford minimum is the lowest rate.

For this wage they are expected to produce work the value of which is double the amount of the schedule prices. For all production above their quota, they are paid an additional 33½ per cent. Thus the minimum wage is \$33. For this wage the mechanic is expected to produce \$66 in repair orders. Should he produce \$120, which many of them do, his pay would be \$33 plus ⅓ (\$120—\$66)=\$51.

Mr. Sturr goes further, however, and, to protect his customers and his business reputation, compels the mechanic turning out a faulty job to "make it right." This rule acts as a check on careless work as, of course, time spent on returned work is not credited on the mechanic's quota. He is absolutely right when he states that the cause of 90 per cent of poor work is due to insufficient or improper instructions and originates in the office at the job writer's desk.

His system for a medium-sized shop is

the nearest fool-proof of any it has been our pleasure to be shown. Every job going through the shop passes through at least three hands besides the mechanic's—job writer, foreman and inspector.

Each of these men are on a straight salary basis, but like the mechanics share

through every branch of the organization, so that everyone connected with it is heart and soul for its best interests and shares in its good fortune. Mr. Sturr has the Ford Miller general accounting system and maintains an office equipped with all the mechanical devices necessary in a well-fitted

[illegible]

**The Repair Order Form Is An Important Feature of Sturr-Bullard Company's System.**

also in the productiveness of the shop. Thus for every job over \$1.50, each one is paid 5 cents per car. One can easily see how \$1, \$2 or \$3 per day bonus can be earned by each of these three men. Now to insure complete instructions, good workmanship and rigid inspection, all three are penalized 50 cents per car for every piece of returned work. Each one is thus held responsible for all three. It is needless to add that very few faulty jobs are turned out.

This idea of compensation is carried out

motor agency office. He is like every other successful business man—always on the lookout for new suggestions, always ready to exchange ideas.

The repair order is made up in triplicate—original on white, duplicate on yellow, and triplicate on manila. The original, reproduced on this page, is the “house copy” and is sent to the shop clerk to be returned to the office and filed when the work is completed. On the back of this sheet are

(Concluded on page 48.)

[illegible]

**A Car Ledger Sheet Which Has Been Successfully Used for Some Six Years.**

# Practical Hints for Shop Mechanics

## Preventing Rust.

A very good mixture which prevents the rusting of machinery is made by dissolving one ounce of camphor in one pound of melted lard. Skim off the impurities and add enough black lead to give the mixture an iron color.

After cleaning the machinery carefully, smear on the mixture. It can be left on indefinitely, or if wiped off after 24 hours will prevent rust for some time. When removed, the metal should be polished with a soft cloth.—S. E., Ariz.

\* \* \*

## Packing Away Curtains.

Curtains may mildew if they are folded and packed away damp. It is always best to wait until they have been thoroughly dried. The assurance of their keeping in good condition is worth the few minutes of extra time spent in drying them.—D. P., Mich.

\* \* \*

## Gasket Punch.

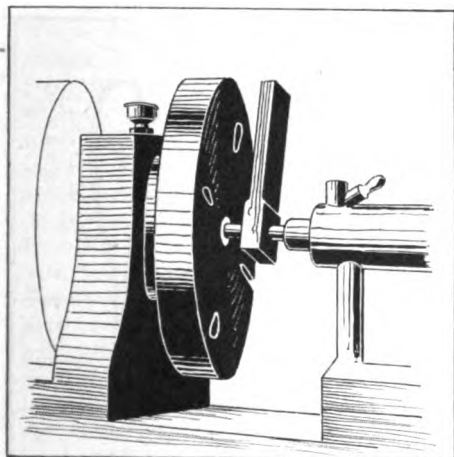
A very handy punch for cutting gaskets can be made from an old wrist-pin of any size, by simply grinding one end to 45° as shown in the accompanying illustration.—D. F. B., N. J.

\* \* \*

## Lathe Alignment Gage.

It is a good policy to check up the alignment of a lathe from time to time. This may be done by means of a gage as shown in the accompanying illustration:

Take an iron bar half as long as the diameter of the face-plate having at one end an enlargement and drill in this end a



Device for Checking Lathe Alignment.

hole which should be counter-sunk on both sides.

Insert this gage between the lathe centers as shown in the accompanying illustration. Measure the distance from the

## ONE DOLLAR EACH!

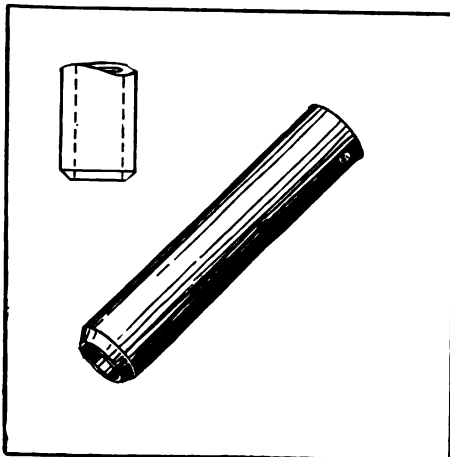
Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

face-plate to the face of the gage in four positions 90 degrees apart. The distance in each position from the face-plate to the face of the gage should be the same. If it is not, the lathe is out of alignment.—M. C. S., Conn.

\* \* \*

## Adjusting Tappets.

In order to make the tappets on a motor very quiet they should be adjusted while the engine is running. To do this, insert between the tappet and the valve stem a 0.03 inch feeler on the intake valves and a 0.04 inch feeler on the exhaust valves. Then screw out the tappet adjustment until the cylinder misses or the carbureter "spits"; when it does this, turn screw slowly in the opposite direction until it is running properly and you



Simple Gasket Punch.

have the quietest adjustment possible. This is quite a trick and some practice will be required before you acquire the proper skill. We do it right along in our shop and we get splendid results.—A. L.

## Tightening Radiator Cap.

Car owners frequently have trouble with leakage at the radiator cap. The reason for this is that the velocity of the water circulation exceeds the capacity of the radiator, or there may be some condition in the cooling system whereby boiling takes place faster than the overflow will take it off.

To cure the trouble, make a gasket of red fiber 1/16 of an inch thick, and place it over the filter cap.

This serves to prevent the cap from working loose, and also keeps the water from leaking out to stain the radiator with blotches of rust.—L. A., Cal.

\* \* \*

## Small Furnace.

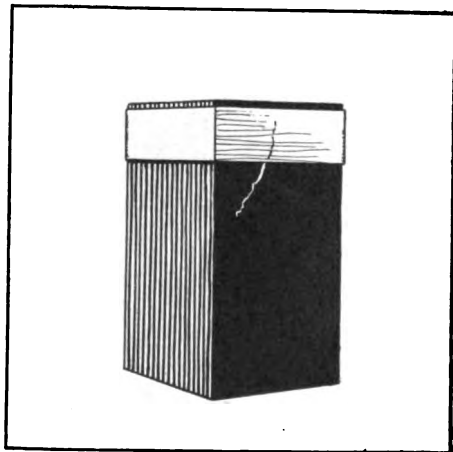
When overhauling a car, all frame rivets should be heated before replacing in the frame, then headed over. A small furnace for heating these rivets can be easily made of fire brick built like a box. The lining for it, also the covering, should be of fire clay.

The necessary heat can be supplied by mixing air and city gas in a small blow torch, which is constructed from a pipe with one leg attached to the gas main, another to the air pressure line, while the third should lead to the furnace. The air and gas supply can be regulated with a valve.—C. L.

\* \* \*

## Repairing a Cracked Jar.

It is next to impossible to repair satisfactorily a crack of any size that may occur in a rubber battery jar. It sometimes happens, though, that the crack may be so



Method of Repairing Cracked Jar.

slight that the solution will leak through when the car is vibrating, though if standing still it will not be noticed.

In this case, a satisfactory repair can be made by cutting a section from an old in-

ner tube into a band of sufficient width to cover the crack, and slipping it over the jar from the bottom. The tube should be of such a size that the band cut from it will exert a pressure on the crack. It will be found rather awkward for one person to accomplish this, but if he is assisted by another, the band can be slipped over the four corners very easily.—G. S., Ill.

\* \* \*

### Stopping Spring Squeak.

If in a hurry to stop a spring from squeaking, pour a little kerosene over it, guiding the oil down the sides with the finger so it will run in between the leaves.

Wipe off the excess oil. Pour cylinder oil over the springs the same way. Now shake the car, so the oil will be drawn in and find the squeak.—N. T., N. Y.

\* \* \*

### Reinforcing Seat Covers.

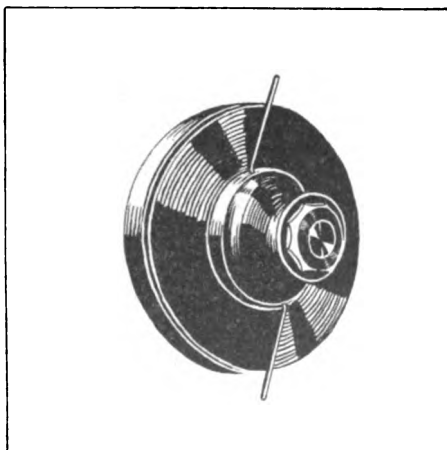
In order to prevent the seat covers used in motor cars from wearing, it is a good plan to reinforce the seams, where the first wear usually occurs, by sewing over them a strip of imitation leather about an inch wide. The strips are sewed to the cover cloth on each side of the seam.

This reinforcement also prevents dust from accumulating in the seams and thereby adds to the cleanliness of the covers.—D. P., Mich.

\* \* \*

### Adjusting Brakes.

Most garages have one kind of an automobile, usually the automobile they sell, on which they do most of their adjusting and repairing. If this is the case, they will find it very convenient when adjusting the brakes of cars that have wire wheels, especially when painted white, to use an old wheel, as shown in the accompanying illustration, from which all but two spokes on opposite sides have been removed.



Convenient Way of Adjusting Brakes.

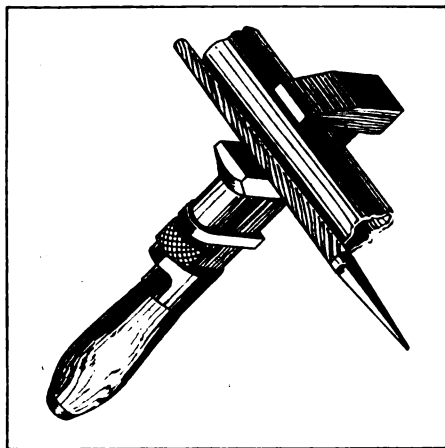
The two remaining spokes can be cut down to half their length and the drum used as a wheel when adjusting brakes. This will make it not only very convenient, but at the same time keep the owner's

wheels from becoming greasy and dirty due to handling.—A. L. M., Mass.

\* \* \*

### Using Wrench for Pipe Work.

Whenever you have to do any pipe work and your only Stillson wrench happens to



Use of Monkey Wrench in Pipe Work.

be broken or can't be found, use an ordinary monkey wrench and an old round file as shown in the accompanying illustration.—M. S., Ind.

\* \* \*

### Finding Rattle in Car.

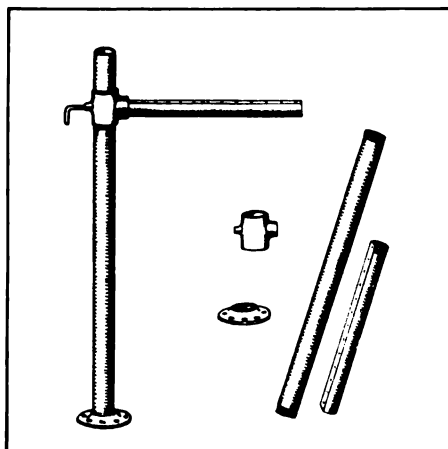
In the case of a rattling door, the defective part can be detected by the simple expedient of holding each door in turn while the car is running. Adjustment of the clearance between the spring bolt and its recess will cure the trouble.—D. F., Mich.

\* \* \*

### Handy Old-Man.

A very handy old-man can be made from old pipe and fittings, as shown in the illustration.

The base is made from one part of a



Handy Old Man.

flange union, the drill rest can be made from a one-inch pipe which has been cut away, as shown, and the tee arranged so that the rest can be raised and lowered.—P. B. M., Conn.

### Thinning Cement.

The attention of car owners should be directed to the inadvisability of thinning rubber cement with ordinary gasoline, which contains too much oil to be safe for that purpose. Oil is a deadly foe of rubber. High test gasoline or bisulphide of carbon are the proper agents for thinning rubber cement.—L. T., Cal.

\* \* \*

### For Clear Windshield.

To keep the raindrops from collecting on the windshield and obscuring the view, apply with cheesecloth or gauze the following solution:

One ounce of water, two ounces of glycerin and one-eighth ounce of salt.

\* \* \*

### Rain Causes Shorts.

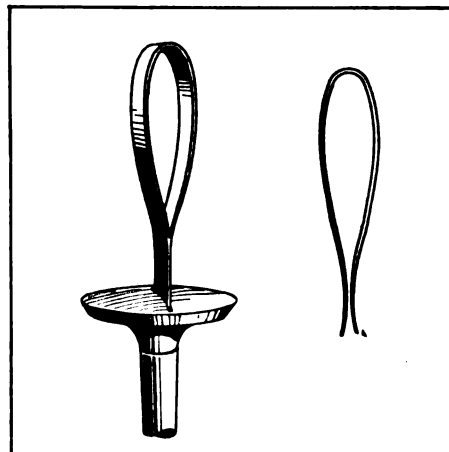
When a car stops in a heavy rainstorm, suspect the distributor, the top of the coil, or the plugs and wires of being wet. Water is an excellent conductor of electricity. A driving rainstorm will enter through the ventilation cuts in the hood and often manage to produce a short circuit which stops the car as effectually as if it were robbed of its spark-plugs.

The only remedy is to wait for the affected parts to dry, or to locate them and dry them off with rags. The best remedy is prevention. Small covers of oilcloth made to fit over the coil and distributor, similar in effect to the leather hood which usually protects magnetos, will keep out the fine water spray which does the damage, and prevent an annoying stop under uncomfortable circumstances.—L. R., Ill.

\* \* \*

### Valve-Removing Tool.

A good valve-removing tool can be made from a piece of spring brass  $\frac{1}{2}$  in. by  $\frac{1}{8}$  in. by 10 ins., with the ends flattened and bent as shown in the accompanying illustration.



Good Tool for Removing Valves.

When the ends are inserted into the slot in the valve and the top of the tool squeezed together, sufficient grip is exerted to allow one to lift the valve out of the guide.—D. F. B., N. J.



# The Proper Repair of Milling Cutters

The Method of Hardening, Tempering and Grinding Milling Cutters Is Explained in Detail in This Article—Anyone Following the Instructions Will Be Successful in Undertaking This Work—Information You Should Have

By J. N. Bagley

It is needless to say that the quality of steel used for the making of milling cutters is of great importance, yet the process of hardening is just as important, if not more so, than the quality of steel. Users of milling cutters will agree that a low grade of steel properly hardened and tempered will give better service than a high grade of steel poorly treated. But when both quality of steel and process of hardening and tempering are taken into consideration, a wonderful cutting wheel can be produced.

The methods of hardening, tempering, and grinding of milling cutters as set forth in this article may not be the best, but the writer has great confidence that any one following the method will be quite successful and amply rewarded for the time spent in making the test.

A suitable place for hardening the cutters will be found in some rather dark corner in the shop. At any rate, the direct sunshine should be excluded from the room. The forge may be used for heating or, in case gas is handy, it is to be preferred. However, as many of the shops, especially the ones in the smaller places, have only the common forge for heating, we will consider the forge at this time.

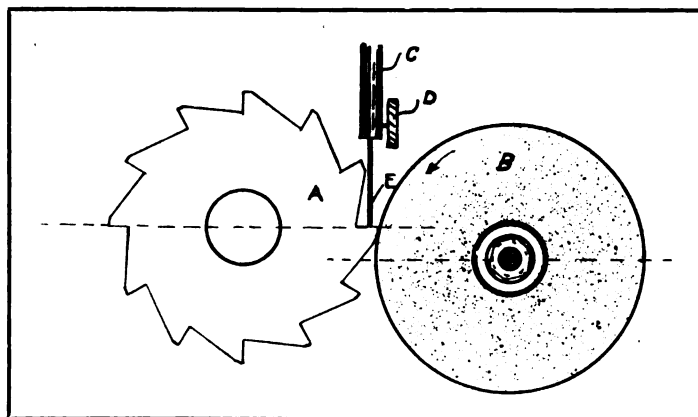
Preparing the cutter for the hardening process is the first important step. In case it has blind holes or sharp angles, they should be protected with clay. Should there be a weak place which would be liable to crack in quenching, the better plan would be to protect it with asbestos. This asbestos will keep the part soft, allowing a greater expansion and contraction and many times it saves a very valuable cutter from the junk pile.

In heating the cutter, use every precaution to heat it slowly and evenly, or some part of it may be ruined before the heat has been well started. In case the heat is applied slowly and evenly, a cutter may be heated even to excess without serious damage, although the proper heat is much better. If the cutter is heated unevenly or overheated, there is danger of cracking it in quenching. Many times the teeth will crack and part company with the body of the cutter.

In case a mistake is made in heating, a very good plan is to remove the cutter from the fire and place it to one side. Cover it over with finely burned ashes and

allow it to cool very slowly. After this, the operation of heating may be repeated.

Large cutters must be handled differently from the small ones; that is, more care should be taken to get a fire that will accommodate the larger one in a uniform manner. Make the fire good and deep in the forge with plenty of good, well-coked coal as a foundation, and bank the sides well up with fresh coal. Now make a bed in the live coals of the proper size to accommodate the cutter and place it flat and even in the coals, being careful that the air blast will strike evenly under the cutter.



Method of Grinding Milling Cutters on the Emery Wheel.

Begin to heat slowly until a uniform red commences to show over the entire cutter, then place some slats or boards about  $\frac{3}{4}$  to 1 inch thick under the cutter. Use the air blast lightly until a bed of live coals is again under the cutter. Turn the cutter again and place a fresh supply of pine slabs under it.

The chances are, unless the cutter is very heavy, that a couple of applications of pine slabs will be sufficient, but in case more heat is necessary, continue to use the slabs, each time turning the cutter over. When the cutter has been heated evenly to about the desired heat, continue a little longer so that the heat may be on the rise at the time of quenching.

Remove the cutter from the fire and place in the brine bath, leaving it in the bath for about one minute, after which take it from the brine and put it into a bath of oil, leaving it there until it is entirely cold. The hardening of the cutter is, without doubt, the most particular of any operation entering into the making of milling cutters.

The plunging or quenching is a very simple operation, but there is a right and a wrong way of doing it. Should the cutter

be a thin one, the best plan will be to dip it vertically, for the simple reason that if it were applied flat side down, the lower side would naturally be cooled the faster and the cutter would have a tendency to cup or warp, so to speak. Although this might be to a very small extent, the cutter might be rendered absolutely useless, so far as answering the purpose for which it was made.

In case we are to dip or plunge a cutter with a long hole, the better plan is to dip it with the hole vertical, allowing the water to circulate freely in the hole. There are special cutters with large recesses and these should be dipped with the recess up. If they were dipped with the recesses down, steam would be formed and prevent the water from coming in contact with the cutter. This might result in a crack or hard and soft spots in the region of the recesses.

One important rule to be remembered is to cool symmetrical parts simultaneously and to let the water have free access to every part of the cutter as nearly at the same time as is possible. Should one prefer, the cutter may be cooled sufficiently so that no color will show at the cutting edge if the cutter is polished immediately.

The larger cutters may be removed from the bath just as soon as the cutting teeth are hardened. In a very few minutes the heat in the body of the cutter begins to run out to the teeth, but just before it reaches the teeth the cutter should be again plunged for about a second. This may be repeated three or more times, according to the size of the cutters.

When at last they are cold, they should be put back into the fire and maintained for three or four minutes at a heat sufficient to show color—a very light straw—and left to cool in the air, not draft. The teeth should be as hard as a good new file, in fact they should be hard enough to scratch glass.

One of the first considerations for sharpening milling cutters is the grinding wheel. The grinding wheel should be neither too coarse nor over fine. A coarse grade of wheel, sufficiently hard so that when in use the emery will not fly, is found to be best suited for most classes of work and less liable to draw the temper of the milling cutter.

The grinding wheel should be kept clean, as a wheel with a dirty or gummy surface will not cut well and will have a tendency to draw the temper from the cutting edge. A gummy, dirty wheel also has a tendency to cut and gouge, leaving a very irregular surface.

There are a number of methods employed for cleaning the grinding wheels, but the methods which follow have been found by the writer to be very satisfactory.

In case the face of the wheel is gummy, dirty, or irregular, the diamond truing tool will be found the most satisfactory, for it not only removes the dirt, but trues the face of the wheel as well.

Should the side of the wheel be dirty and irregular, a very good plan is to sprinkle coarse emery upon a surface plate and rub the surface of the wheel lightly. This will remove the dirt and gum from the wheel, leaving the sharp particles of emery projecting free to cut.

In case the cutting wheel draws the temper from the cutter after it is thoroughly cleaned, reduce the cut until the heating is stopped, even though it is necessary to make two or three cuts to get the cutting edge sharp.

In grinding milling cutters or reamers it is the better plan to run the wheel the entire length of the cut and pass off at the end before setting the cutter for the second cut, as this will eliminate the danger of gouging or scoring the cutter at the extreme outer ends.

Much care should be exercised in keeping all bearings and joints sufficiently tight so that there will be no variation in grinding the different cutting edges of the milling cutter. Cutters should be kept sharp at all times, for a cutter that is kept sharpened will outwear a cutter that is dull and drags, pushing rather than cutting the metal away.

When possible, or rather practicable, it is better to grind cutters with the emery wheel running onto the cutting edge, as shown in the accompanying illustration, securing a finer cutting edge on the tooth. The central axis of the grinding wheel, *B*, is slightly lower than that of the milling cutter, *A*. To make sure that the cutting edge will have clearance and pass freely from one cut to the other is a matter of importance. This, as a matter of fact, can be controlled to a large extent by the adjustable guide shown at *C*, having a movable leg, *E*, held in position by locking nut *D*. By shortening leg *E*, the cutter may be revolved on its axis, giving more or less clearance as desired.

The necessary amount of clearance must be determined by the material to be cut, especially in the grinding of reamers to be used on brass, which for free and easy cutting should have a clearance of five to ten degrees. Should we use a reamer on brass with a greater degree of clearance, it will be liable to chatter and leave a wall rough and pitted.

Steel and cast iron to be faced with the milling cutters should first have the scale removed and the cutters ground with the proper clearance. From about five to 12 degrees rake will be found best for materials of this kind. The clearance will vary from three to eight and many times to even ten degrees, depending upon the hardness of the material cut.

Should there be a tendency to chatter, the cutting edge of the cutter should be treated with the oil stone until the chattering is stopped. Chattering is nothing but the cutting-edges biting and letting go in rapid succession. There are times on special jobs of very broad work where it is necessary to grind the cutters so as to remove the rake entirely, allowing the cutter to drag in order to prevent chattering. In nearly every instance, especially on broad heavy work, place the cutter ahead of the center, slightly exposing a larger cutting-edge to the work.

When using multiple cutters, a better plan is to space them unevenly, giving the cutting the "staggering" effect, thus preventing chattering. The nearer the chuck or center the cutter can be placed, the less liable it is to chatter and the smoother it seems to cut.

As a rule, the angle-clearance on all tools of this kind must be more than the spiral generated by feed at the smallest diameter of the cutting points plus a sufficient clearance to be really forced to the work below the cutter, which is very close to three degrees.

The angle-clearance may be varied by "stoning" to prevent chattering in case it is necessary, but it will hardly be necessary under ordinary conditions.

### **Welding, Cutting and Brazing Practice.**

*(Concluded from page 25.)*

point permitted the rods to be melted more in harmony with the thin metal of the tubes. That is, the thinness of the copper in the tubes about balanced the melting point of the bronze filler so there was no danger of overheating the tubes while endeavoring to melt the filler. In other words, the thin section of the copper tubes, in effect, lowered their melting point, since only the surface was melted.

A special grade of patent flux powder was used throughout the work and was applied by dipping the heated end of the filler rod in a pot containing it. Enough powder adhered to the filler rod with each dip to flux one ripple or drop of melted filler, the flux being carried to the braze as soon as possible after dipping.

Brazing fluxes are supposed to do several magical tricks when applied to the melting joint. This is sometimes considered doubtful. The writer thinks the principal use of a flux is to prevent the melting metal from being oxidized by the action of the surrounding atmosphere. Its office, then, is to cover the melting metals as much as pos-

sible to prevent any oxygen of the air, or of the torch, from attacking and turning them to oxide. The flux powder forms in flakes or partitions to prevent the metals from fusing into a homogeneous mass, and melts and spreads over the surface of the bond, thus warding off the oxygen.

If the brazed joint is not properly made and guarded, some of the oxide is bound to be trapped, thus mixing through the bond and weakening it. It is readily apparent then, that a good deoxidizing agent is advisable in brazing work such as has been discussed. Of several methods of applying flux, the one just described is probably the simplest and easiest.

When the last break had been welded, the whole device was placed aside to cool. No covering or banking was employed to retard the cooling process as is the usual custom in welding or in brazing heavier parts. Since there was no danger from contraction cracks, the job was allowed to cool at will. When cold enough to handle, it was tested for pin holes or leaks in the joints.

Had not the special tip been devised, it would have been necessary to tear down the whole apparatus in order to replace the leaking tubes with new ones, which shows the importance of studying every job from all angles.

### **High Price of Electric Cars Prejudices Chilean Buyers.**

It appears that there is a prejudice against the use of electric cars in Chile, but a market for them could probably be developed. One objection to the electric car is its price, for a large gasoline machine can be purchased for the price of an electric and large cars are chosen because of their seating capacity and imposing appearance.

In the cities, especially in Santiago, where there is next to no grade and the streets are well paved, there appears to be a good field for electrics.

The two points which appeal to buyers of electrics in the United States, namely, cleanliness, and ease of operation, do not have the same effect in Chile, for driving by women is practically unknown.

### **5,000 Motor Transport Lines Now in Successful Operation.**

In recent reports regarding the development of motor transportation, it is stated that in New York state there are more than 400 motor express lines. It is estimated that there are not less than 5,000 of these lines operating in the whole country.

A map of the route of the American Motor Freight Co., with offices in Sioux Falls, S. D., includes 80 towns in Minnesota, Iowa and South Dakota. The New England Transportation Co., which operates out of Boston, is reported as having 150 motor trucks in service which operate over 12 routes covering 1,000 miles in length.

# Readers' Questions and Answers

Conducted by E. C. Pohlmann

## Wiring Diagram.

Please explain the construction and operation of a coil. Also publish in the next issue the wiring diagram of the Moon car, Model 6-30.—J. F., Wyo.

A coil is a machine or device used for transforming current of low voltage and high amperage such as is obtained from the storage battery to high voltage and low amperage.

Essentially the coil consists of a central core, *A*, of soft, small iron wires, as shown in the accompanying sketch of the Moon coil. Insulating material in the form of a tube covers the core. Around this are wound a few layers of coarse wire, *B*. This is called the primary winding. The turns of wire are insulated from each other by the use of a wire with an insulating cover or by sheet insulation between the layers, the spaces in between being filled with paraffine.

Over the primary winding are wound a great many turns of exceedingly fine wire, *C*. This is called the secondary or high-tension winding. The turns and the layers of wire are insulated as in the primary winding.

One end of the primary winding is attached to a binding post, *D*, for receiving the current from the battery or generator, and the other end connects to a device for interrupting the current, in this case the circuit breaker in the distributor. One end of the secondary coil is connected to the same binding post, *E*, as the end of the low-tension coil. The other end of the secondary coil is attached to a binding post of its own, *F*.

An electric condenser, *G*, is used in connection with an induction coil. Its function is to strengthen the action of the coil and prevent the contact points of the interrupter when separated from fus-

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

ing due to the tendency of the current to keep flowing in an arc across the gap.

The magnetic core, acting on the primary winding, has a tendency to maintain the arc. The condenser counteracts this effect by receiving and storing the electrical energy and thus breaking down the arc quickly.

The operation of a coil is very simple, and is essentially as follows:

When the circuit breaker in the distributor is closed, a current of electricity flows through the primary winding and magnetizes the core. The next instant this current is interrupted by the openings of the breaker points and induces or sets up a high voltage current in the secondary winding. The high tension or voltage current that is thus set up in the secondary winding is conducted through

a heavily insulated cable to the center terminal of the distributor, where by means of the rotor it is distributed to the spark-plugs.

The wiring diagram you ask for will be found on one of the pages in this department.

\* \* \*

## Meaning of Terms.

Will you please publish the meaning of the following terms:

1. Flash point of oil.
2. Viscosity.
3. Ampere-hour.
4. Torque.

1. The flash point of an oil is the lowest temperature at which the vapor from an oil will ignite but not continue to burn.

2. Viscosity is the internal friction or resistance to the flow of a liquid. The viscosity of an oil may be considered as the measure of the body and also as the measure of the thickness of the film of oil which would be maintained on the cylinder walls. It is also an indication of the ability of the oil to resist the pressure of the explosion gases which tend to force their way past the piston rings.

3. A current of water in a pipe is measured by the amount of water that flows through a pipe in a second, as, 2 gals. per sec., 7 gals. per sec., etc. In the same way a current of electricity is measured by the amount of electricity that flows along a wire in a second, as 2 coulombs per sec., 7 coulombs per sec., etc. The coulomb of electricity is merely a quantity of electricity just as a gallon is a quantity of water. Fortunately we have a special name for this rate of flow of one coulomb per sec., which is the ampere or the larger unit ampere-hour which means one ampere flowing for one hour.

4. Torque is a measure of the tendency of a force to rotate a body about an axis. The torque of an engine is its turning moment and is generally expressed in pound-feet or the number of pounds of effort exerted at a radius of one foot.

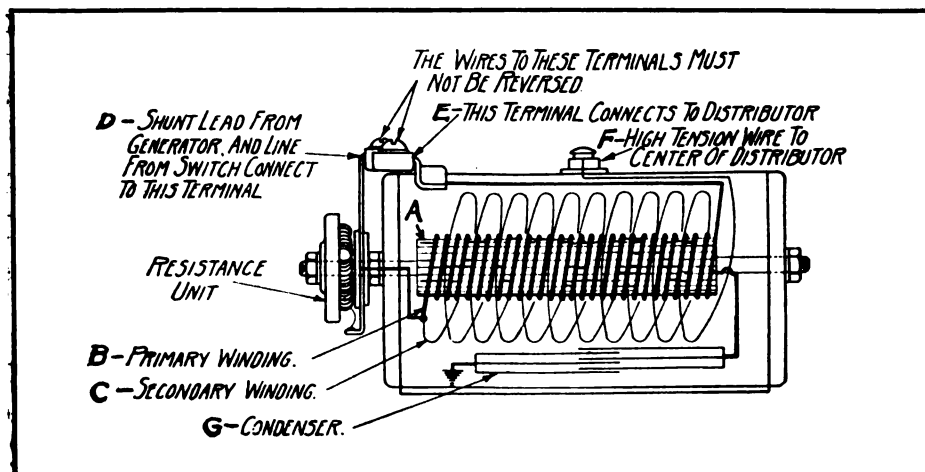
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## Ford Troubles.

1. I find it necessary in any kind of weather to jack up the rear wheel of two or three Fords in this locality before they can be cranked. I have heard that it was end play in the crankshaft. What can be done for this?

2. In one Ford the oil seems to increase in quantity. I can drain off one pint to a quart out of the top pet cock occasionally without addition of oil. This extra is gas I suppose, but how does it get by the piston? The car is working good, and pulls well. I don't see how gas gets by when the car is in this condition.—L. M. G.,

1. The trouble you are having in cranking the cars is probably due to some fault



Diagrammatic Sketch Showing Construction of Ignition Coil.

of the clutch or the clutch mechanism. Examine these carefully. Set the hand lever as far back as it will go and then examine the clutch to see whether it is fully disengaged and whether the emergency brakes hold.

If the clutch is not at fault, it may be due to excessive looseness of the levers or rods which operate the clutch in connection with the emergency brake. Usually this trouble is due to a worn clutch lever screw which bears on speed lever and requires an adjustment to keep the clutch in neutral position.

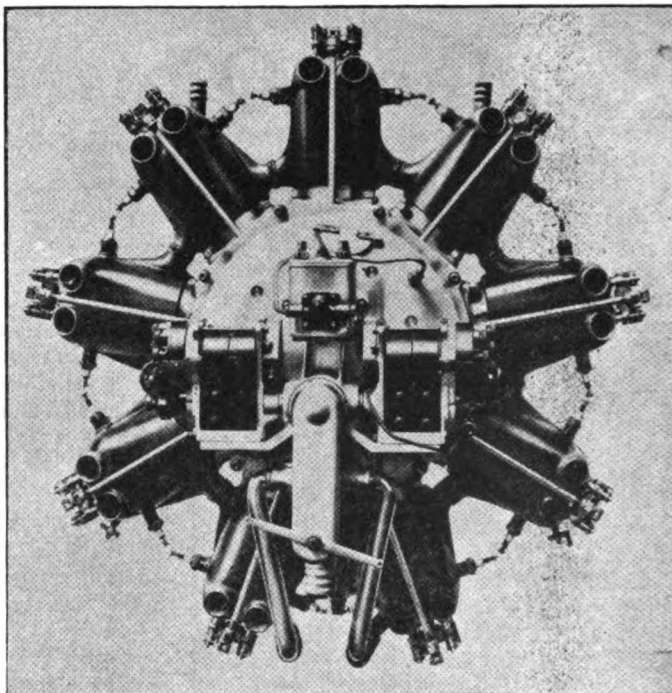
If end play of the crankshaft is causing the trouble, adjust the clutch to take care of this end play so that it will release when in neutral.

2. The increase in oil is due to condensed gasoline working past the pistons and into the crankcase. If you are using steam or water with the charge, a portion of this works past the pistons and into the crankcase. Then, too, a small water leak may be causing the trouble.

Even with the engine working very well, tests show that considerable of the present day fuel, which contains high boiling end points, condenses in the combustion chamber on the suction and compression strokes and works past the pistons and into the crankcase. In the winter time, this amount of condensation, when no provision is made to heat the charge between the carburetor and the engine, is very great and can easily amount to from a pint to a quart a week.

In December, 1919, tests were made in Chicago on a considerable number of cars and trucks using commercial gasoline and

Nine - Cylinder,  
Star-Type Engine  
of 300 H. P.—Cyl-  
inders Are Steel  
with Welded On  
Jackets and the  
Intake Pipes Are  
Inside the Jackets.



lubricants as purchased in the Chicago market. In some cases the cars were new as received from the manufacturers and in other cases old, or old and repaired.

The test made on a  $3\frac{1}{2}$ -ton Diamond T truck showed a dilution of 19 per cent in ten days on a mileage of little more than 200.

In the accompanying curves are given the results of a test on a  $3\frac{1}{2}$ -ton truck (Packard) which had run 12,551 miles, but was overhauled on May 5, 1919, and fitted with new rings. The dilution at the end of the

tenth day of the test was 20.5 per cent.

The results of other tests show an increase of three pints of lubricating oil in seven hours' operation.

The amount of fuel that gets by the pistons is not the same for the same make of car, but is influenced by the following:

1. Piston clearance.
2. Richness of mixture.
3. Improper ignition.
4. Operating temperature of motor affected by weather.
5. Body of lubricant or thickness of film on walls of cylinders.
6. Condition of cylinder walls.
7. Condition of piston rings as affecting their all-around fit in grooves and against the cylinder walls.
8. Intermittent operation.
9. Priming and using the choker when engine is cold in starting.
10. Choking when overloading.
11. Character of fuel.
12. Carburetor out of adjustment.
13. Vacuum system out of adjustment.

Furthermore, the amount of dilution is influenced to a great extent by the temperature of the surrounding air. The colder, the greater the amount.

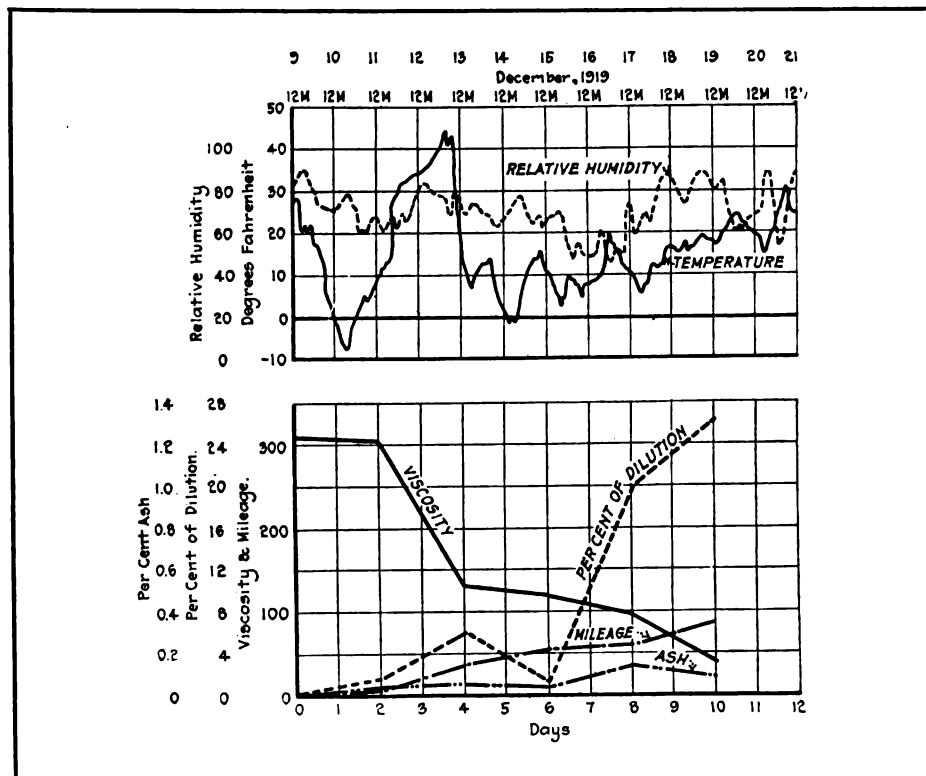
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### V-Type Engines.

Is there any engine built on the V-type with cylinders in a complete circle such as the Gnome rotary engine? If such an engine is built, can you give a description of it?—T. J., Minn.

We do not know exactly what you mean by a V-type engine with cylinders in a complete circle such as the Gnome engine. The Gnome type is a rotary engine; that is, the cylinders rotate around the crankcase.

Recently, a nine-cylinder, water-cooled, star-type engine such as is shown in the



Viscosity and Dilution Tests of Oil,  $3\frac{1}{2}$ -Ton Packard Truck.





# World's Champion Light Six

—a title we are proud of  
—a car you'll be proud to drive

FOR four years the Elgin Six has won first place, perfect scores and highest economy honors in every one of the many stock car races, endurance runs and economy contests it has entered.

This unrivaled series of victories, proving the greatest possible merit in the three vital points of motor car excellence, has earned for the Elgin the highest honors in motordom and stamped it the World's Champion Light Six.

Get behind the steering wheel of this smooth-running, easy-riding motor thoroughbred and you'll realize why men who own several cars prefer to drive the responsive Elgin Six, with its racy lines and beautiful finish.

An attractive booklet tells of a dozen triumphs of strictly stock Elgin cars in speed, endurance and economy contests that have won for the Elgin the proud title of World's Champion Light Six.

This booklet, free for the asking, will thrill car lovers with its story of wonderful performance and car stamina.

**ELGIN MOTOR CAR CORPORATION**  
**ARGO, ILLINOIS**  
(Suburb of Chicago)

accompanying illustration has been introduced by the Fiat company. This engine is used for airplanes.

The nine cylinders are steel forgings with welded-on water jackets and, consequently, are heated by the water circulation system. There are four valves per cylinder mounted in the head and operated from a single plate cam and push rods. The crankshaft, which has a single throw, and is carried in ball bearings, receives the master connecting-rod and the eight auxiliary rods, all of which are mounted on ball bearings.

Ignition is assured by two high tension magnetos mounted on a platform on the rear face of the crank-chamber. Each magneto fires nine plugs, which are mounted horizontally in the cylinders below the valves; thus either magneto is capable of running the engine. On the same face of the crank-chamber is the double piston-type oil pump, and immediately below it is the water pump. The single carbureter, with adjustment for high altitude flying, is also on this side of the engine. The mixture is taken through gas passages in the base chamber to the pipes inside the water jackets, and from there to the valves in the head.

This engine develops 300 h. p. at 1,800 revolutions and 320 h. p. at 2,000 revolutions. Its total weight empty is 500 pounds, and with water 546 pounds.

\* \* \*

### Lubricating System.

Please explain the oil pump used on the Elgin engine and also the lubricating sys-

tem? The motor on this car has been heating very much lately and after a careful examination I have decided that it must be due to the oil pump. What do you think?—J. A., Wash.

The Elgin motor is provided with an automatic lubricating system which operates as follows:

Oil from the lower half of the crankcase is sucked through a strainer into the pump which is located on the left side of the motor. The pump then forces the oil through another pipe to the upper part of the oil pan where the oil runs into pockets located in the oil pan baffle plate. The oil is taken from these pockets by means of dippers on each connecting-rod cap and the continual splash of oil in the crankcase lubricating the cylinder walls, wrist pins, camshaft, etc. The excess oil filters back to the oil pan through a strip of felt packing located between the baffle plate and the oil pan.

The oil pump consists of a pump casing in which a plunger moves back and forth, acting as a piston. A stiff coil spring forces the plunger inward, thus sucking in a quantity of oil through the inlet check valve. The plunger is so located that a cam on the camshaft comes in contact with it every revolution. This cam forces the plunger outward against the tension of the spring, thus forcing the oil up through the outlet check valve and through the feed pipe as stated in the preceding paragraph.

It will be seen that every revolution of the camshaft forces oil through the feed

pipes and the greater the speed of the motor, the more oil is pumped, thus making the system automatic. It requires no attention or adjustment.

Examine the oil gage to make certain that it is indicating the proper amount. If the gage is right, take the pump apart and clean it. Dirt may have lodged somewhere in the pump. Examine the spring for tension and while the pump is off, blow compressed air through the feed-pipes to make sure that no dirt is obstructing the flow of oil. The trouble is more than likely to be due to an obstruction in the cooling system, improper timing of the spark, or poor carbureter adjustment.

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### Aluminum Metal Formula.

Please furnish me with a formula for aluminum castings suitable for motor car pistons.—A. S. L., Cal.

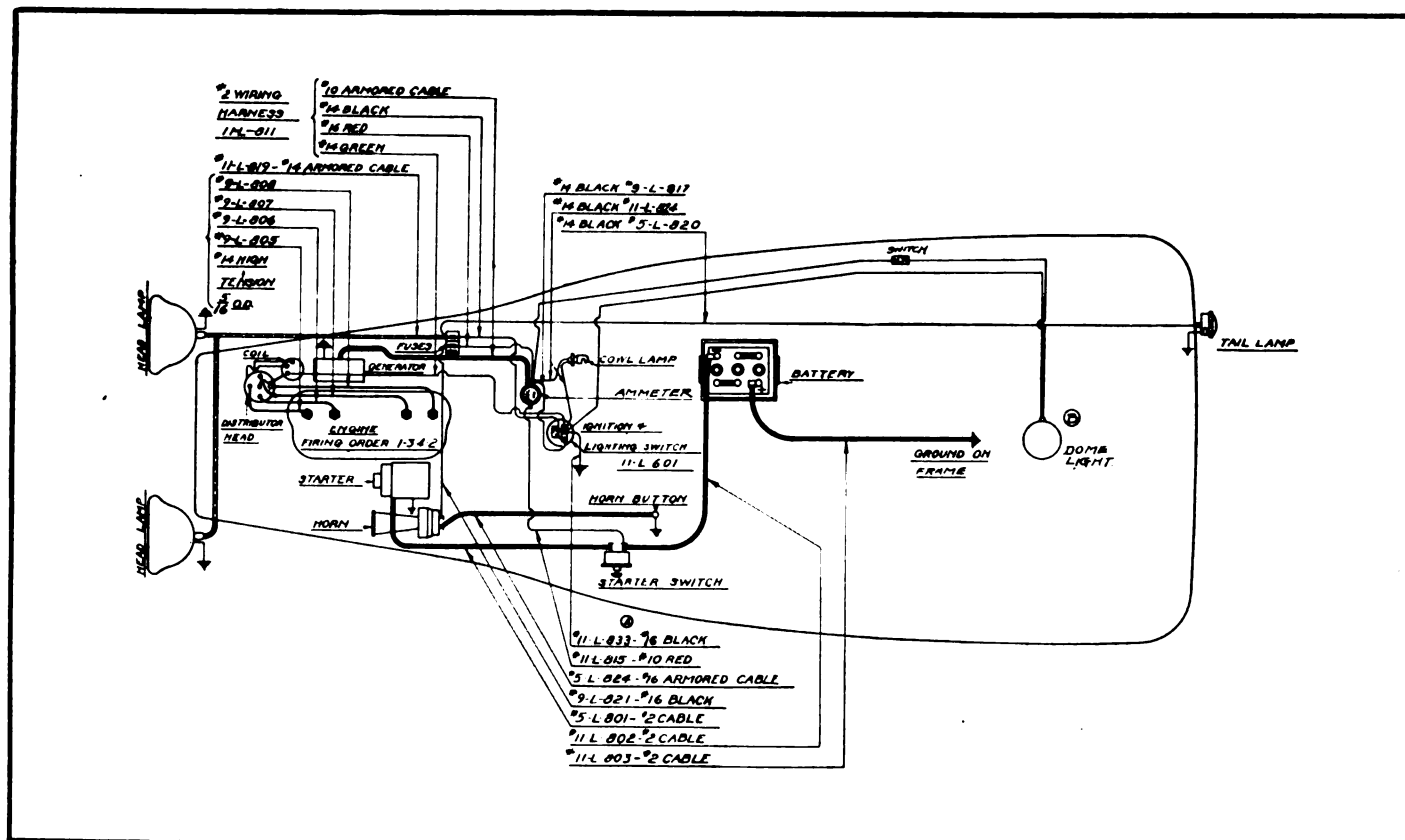
Aluminum, 80 per cent; zinc, 15 per cent; copper, between two and three per cent; manganese, not to exceed 0.40 per cent. The aluminum should not run less than 80 and the zinc not over 15 per cent.

\* \* \*

### The Peugeot Car.

Can you give me any specifications of the Peugeot automobile manufactured in England?—A. C., N. J.

The Peugeot is a 32-horsepower, six-cylinder chassis. The engine has a bore of 95 millimeters (3.74 inches) and a stroke of 140 millimeters (5.51 inches). It is fitted with two Zenith carbureters, and is equipped with motor pump and magneto.



The Wiring Diagram of the Moon 6-30.

# Install a Curtis Air Compressor



## The Curtis Sign

Illustrated above—is 10x14 inches—baked enamel on steel. Cannot be bought, but is furnished FREE with every CURTIS Garage Air Compressor—and cannot be had in any other way.

Display a CURTIS "FREE AIR" SIGN above your door—it inspires confidence and will help build your business. Motorists are looking for this familiar CURTIS slogan—because they know oil rots tires—and that a CURTIS Air Compressor furnishes AIR FREE FROM OIL, which means fewer blowouts, greater tire mileage and less repairs. The CURTIS is the ONLY Garage Air Compressor with the controlled splash oiling system that eliminates all danger of forcing oil into the air line.

## CURTIS AIR FREE FROM OIL

Investigate the many exclusive features of CURTIS Garage Air Compressors. The line is complete—five sizes—stationary or portable. Just write your name and address on the margin of this advertisement—tear it out and send it to your jobber, or to us direct, for complete information and prices.

**Curtis Pneumatic Machinery Co.**

1515 Kienlen Ave., St. Louis, Mo.

Branch Office—530-U Hudson Terminal, New York City



## DUNTLEY MAGNETO BREAK TIMER-WIRE & TERMINAL GUARD

*An Unbeatable Combination*

### THE TIMER

The reputation of its perfect performance has spread like wild fire. Ford Owners everywhere are demanding the Duntley—The Timer that has made good.

### Six Supreme Reasons for Its Popularity

1. It has no whirling grinding contacts.
2. It is self cleaning.
3. It is equipped with wear proof metal rollers.
4. It is friction proof.
5. It requires no lubrication.
6. It is equipped with 8 tungsten points.

*Everlastingly Guaranteed to Always Make Good*

### THE WIRE AND TERMINAL GUARD

Why be bothered any longer with broken wires, loose connections and short circuits, that utterly destroy the efficiency of the entire ignition system, causing trouble and grief.

The Duntley Wire and Terminal Guard does away entirely with the trouble makers.

Carrying the wires from the coil box to the timer in a flexible metal conduit and protecting the timer and terminal with a dust proof metal cover it affords absolute protection to the vital parts.

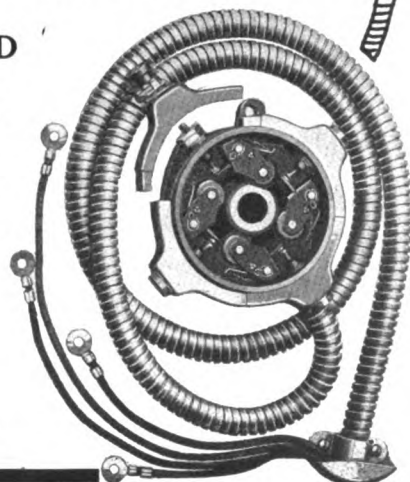
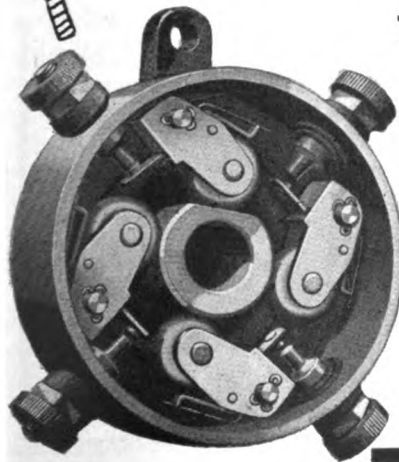
Why wait?

Dealers: Write us today, our proposition will interest you.

**J. W. DUNTLEY**

1006 Michigan Ave.,

Chicago, Ill



# Abuse of Selling Tires at Discount

There's No Abuse More Irritating to a Tire Dealer Than the Competitor Who Sells at a Discount—Do the Manufacturers Intend to Do Anything?—If Not, Dealers Should Combine to Demand Protection from Them

By F. E. Morriss

*Manager, Quick Tire Service, Inc., Dallas, Texas*

Next to the adjustment abuse, there is no more bothersome or irritating thing that a retail tire dealer has to contend with than the competitor who sells his goods at a discount.

Frankly, for this, the automobile manufacturers are to blame. Dealers should be compelled to sell their goods at list price, or their contracts should be canceled.

The margin of profit for the dealer is no more than what will carry a business organization through to success, if they get every cent of the profit on every tire sold.

The names of the individuals who have started in the tire business and failed, or had to sell out at a loss are legion. If the truth were known, 90 per cent of these cases of failure, for they are all failures, are attributable to the fact that the dealer, knowing that he must lose some sales if he would hold fast to list prices, has tried to beat the price-cutter, by giving away his legitimate profit.

The result has been that both price-cutters have come a cropper, and have been forced to give up what might have been a paying business had they sold their goods on merit and turned down friend or stranger who dared suggest that they should make their sales at his prices.

The writer has known of men, who have been so unscrupulous as to pretend to be engaged in the garage business and, giving the name of some well known garage at accessory and tire stores, have succeeded in having goods sold to them at the discount usually accorded such a business, paid cash for them, and gone from the place laughing in their sleeves that they had put one over on a business institution.

Such buyers are plain crooks, and houses that are so careless with their discounts are either very slack in their business methods, or are conniving with such people to undo the fabric on which good, honest business methods are founded.

It would seem, from some events that are taking place with the large

tire manufacturers, that the price cutter will soon come into his own. But even so, all legitimate dealers should combine, and formulate demands on the tire companies to put a stop to the practice of permitting anyone to handle their goods, who will not maintain prices.

There is an old saying to the effect: "Very few salesmen can be trusted with a sliding scale of prices, as most

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## ADVERTISING AND CHARACTER.

You can believe in the character of any establishment that regularly spends money to create confidence. Advertising doesn't pay if it isn't honest; and it's cheaper to be honest than to pay for unprofitable advertising. Advertising is protection, identification, warranty of quality and of value. No merchant calls attention to himself if he isn't prepared to profit by examination of his wares.—Herbert Kaufman.

---

of them soon slide to the bottom, and once there make no effort to leave it."

Price cutting, which is purely business throat-cutting, should have no place in modern business, and the sooner it is stopped in the tire business, just so soon will Bradstreet and Dun stop, to a large extent, recording failures in that business. The practice is bad for the manufacturer; bad for his salesmen; bad for the dealer and his store salesmen; and above all, bad for the customer.

Imagine a minister of the Gospel asking for the discount that a large user of automobile tires, a commercial account, is entitled to under the rules of most of the tire companies.

This would not be so bad, but in the same day, the principal of a school for boys deciding that he is entitled to favors, will call and ask for a discount. Behind him comes another consumer, and he must have one, but would not be content with just a commercial discount topped with a 5 per cent cash discount. He must have more because he has a friend, who has a friend who is in the tire business, and the friend in the tire busi-

ness is too cowardly to be a business man.

These are the conditions that confront the dealer in every city and hamlet. The man who has the courage of his convictions, and will stand up to these people and inform them that he is not selling discounts, but first class merchandise, is the man who will hold their friendship, and more than likely their business.

In these times, particularly, the man who keeps the profit on his goods, is the man who will stay in business. The other kind, in all times, will come and go, but while they flow on like Mr. Tennyson's brook, they defile the business life of a community. And it takes hard work on the part of the true business men to recover the lost spirit of business, when its morale has been so sadly broken down.

Let the dealers of the country get together and voice their demands to the manufacturer, and the gyp, as well as the price-cutter will soon be a thing of the past.

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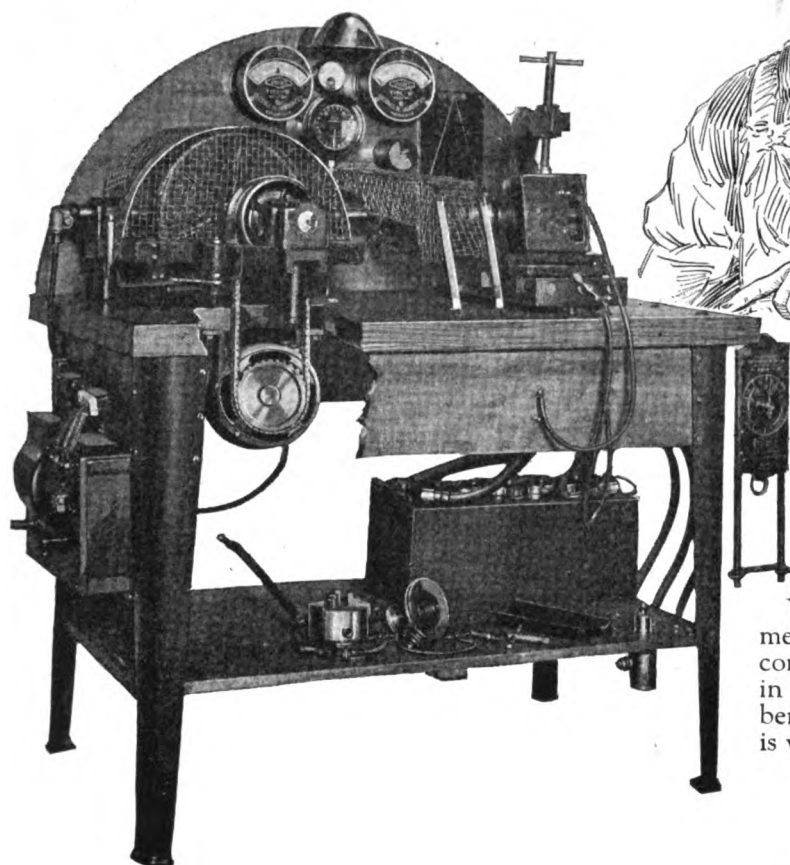
## Greater Attention Paid to Interchangeability of Parts.

The experience of the army both overseas and in the United States shows that approximately 200 parts are required for each vehicle, everywhere. Scientific data amassed by the Motor Transport Corps, on the matter of maintenance and repair service will be of enormous value to the industry. Speaking of repair service, General Drake says:

"Apparent economies in this class of parts has proved lack of breadth of view. Every user and manufacturer must honestly study and understand quantities required for actual repair, for wider distribution than actual demand, and for shrinkage in factory, in transit, in sales, and in users' service stock. Ignoring human inability to make 110 pieces suffice for 100 new vehicles and 10 actual repair jobs, has paid an enormous penalty in useful vehicle hours. All other vehicle hours are a financial burden on manufacturers as well as users."



# Bigger Profits for YOU—NOW



**Y**OUR ability to test any generator starting motor or magneto thoroughly and in a very small amount of time, which you can do with the Becker Bros. Universal Test Bench, is the kind of service your customers are looking for.

You know from experience that such an equipment will enable you to make your service complete—such a service pays big profits, not only in cash business, but in satisfied customers. This bench is very easy to operate—its cost of operation is very small.

## Sold On Cash or Monthly Payment Plan

Whether you desire to purchase the Becker Brothers Universal Test Bench on the cash or installment plan, do not hesitate—every day you do without an equipment of this kind, you are losing a great deal of profit you might as well have. Write us today for complete description and prices—no obligation.

### BECKER BROTHERS

23-25 N. Jefferson Street - Chicago, Ill.

**B.B.B.**

*Stands For Quality*

Becker Brothers' Brushes stand for quality. You may rest assured that the bench will prove just as satisfactory.

## You Can Buy This Bench Complete or the Parts Separately

We have prepared a folder which gives photographs of all the highly important parts as well as a complete description—it even shows you how to operate the bench.

After reading the description of the Becker Brothers Universal Test Bench and parts in this folder, you will be better able to decide whether you need a complete bench or the parts themselves. The folder will be sent you free on request.

# Becker Brothers UNIVERSAL TEST BENCH

### Trucks Increase Farm Efficiency.

(Concluded from page 17)

\$100. Any thing that saves their time in doing the work required of them makes money for their employers.

Experience in Nebraska has shown that three trips can be made to town, taking in grain or produce and bringing back goods or returning empty, in the same time one trip can be made with a team, assuming the average distance covered is about ten miles. When it comes down to four or five miles, the ratio is about two to one, because unloading and loading forms a larger percentage of the trip time. Four times as many trips with a truck is not uncommon where the roads are in good shape. This ratio ought to be nearer the rule after the millions now being expended in highway construction have been put into permanent roadways.

The truck on the farm brings other advantages than time saved. It enables the farmer to pick his market town, much to his financial profit. Better prices are usually secured where there are two or more elevators or stock buyers competing, unless they take alternate days for bidding high and getting what they want at a non-competitive price. The truck not only makes the farmer independent of one market town, but it makes it possible for him to choose where marketing facilities are best as well as where prices are more satisfactory.

The truck likewise makes it possible for the farmer to enlarge his feeding operations. Where men feed a large number of hogs, for instance, it is seldom that they produce enough corn or other feed on their own farms.

The truck is in favor with farmers for several other reasons. The slow-moving team across a road exposed to the hot rays of a sun, or the chill of a stiff wind, is tough on both driver and horses. A trip to town under those circumstances is to be dreaded, and the prospect of one has been the cause of many a case of sudden illness on the part of hired hands.

The truck represents a larger investment than does a team of horses, but its up-

keep is costlier only when it is in operation. When it stops, the expense halts. Trucks don't have to be curried and fed and watered—tire-some tasks as well as expensive.

Team hauling is a costly expenditure of horse flesh. The maintenance and depreciation cannot be as accurately figured as on a machine, but it exists and it costs. A team that makes a trip to town and back in the morning is done for the day. If a truck does the job, the farmer has the team to work in the fields two-thirds of a day. With a truck he can be halfway to town in the time necessary to hitch a team.

No accurate idea of the cost of farm trucking is possible. The farmers keep no figures and estimates run from 8 to 20 cents a ton-mile. Even the big trucking companies are just waking to the necessity of keeping accurate costs, as they are gradually coming under rate regulation.

Considering the fact that there are about four million farms in the United States, and that 60 per cent of them are unmortgaged, considering also the efficiency that the use of trucks adds to the modern farm, the market for truck sales becomes almost illimitable, even where farmers find it to their advantage—as many are doing—to make co-operative purchases with their neighbors who also act as partners and joint users.

### When Is a New Part Necessary?

(Concluded from page 13)

brakes relined?" There must be a conscious, rather subtle to be sure, but continuous effort on the part of the repairman to win and hold the confidence of the car owner.

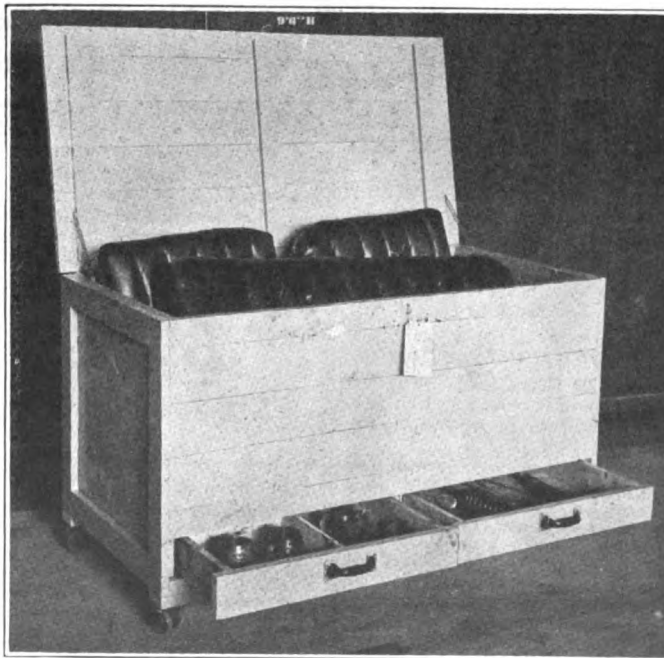
As a first step in this direction, a probable list of the new parts required can be prepared and shown to the owner in advance of beginning work whenever at all possible. The owner will then know, at least roughly, what to expect.

In this connection there is a detail which should prove helpful. When giving an estimate of probable cost, be sure that the estimate is higher than the eventual cost can possibly be. An owner who has been given an estimate of \$20 on new parts for a differential will feel far better when the actual charge proves to be only \$16, than he would were he to be informed that the charge is \$24.

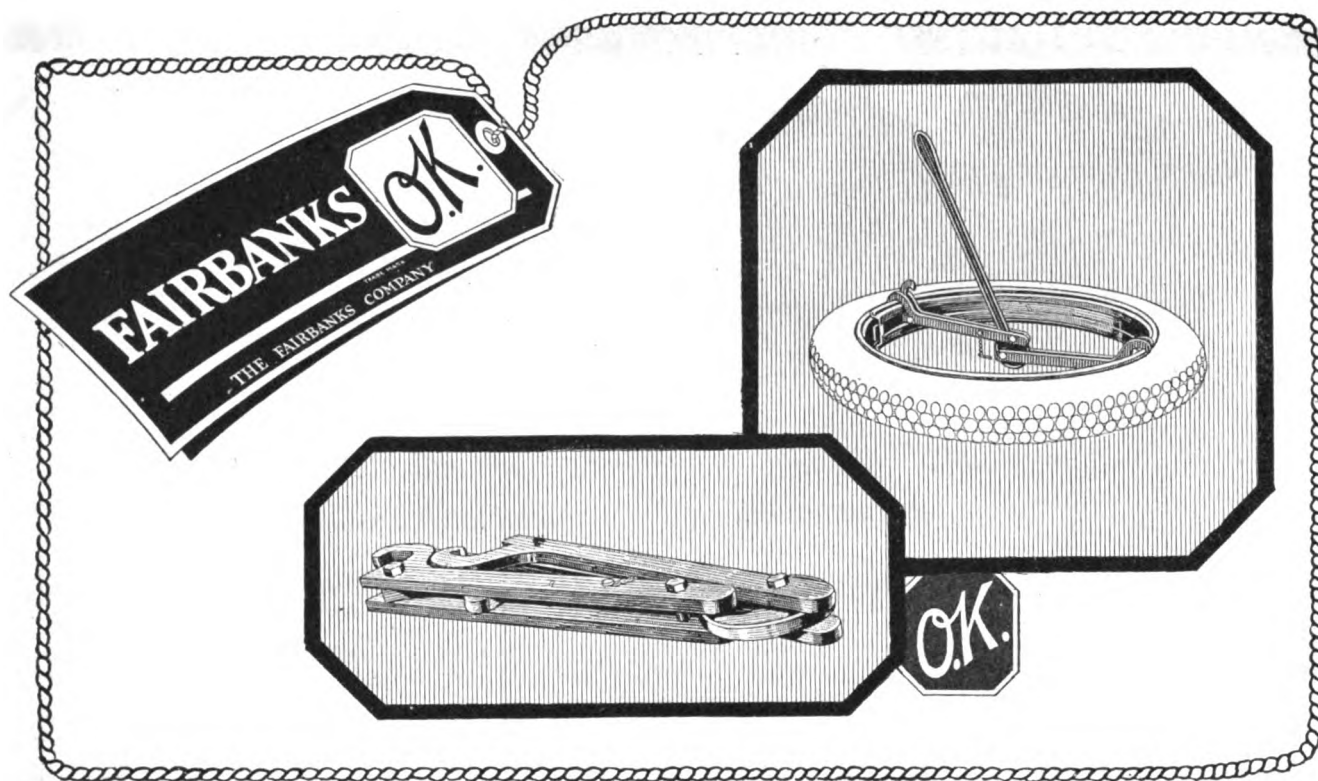
The blanket instruction clause should be retained in the order form, by all means. It is a legal recourse of value in dealing with unscrupulous customers. But it should be supplemented in practice by a request for permission when unforeseen developments show that a large or expensive part is to be needed.

It is all well and good for one to have the legal right to charge a \$50 cylinder block to an owner's cost account. But, if the owner is informed courteously by telephone that examination has revealed that this block will be necessary, he will be in a far more agreeable mood to pay this \$50 than were he merely confronted with the bold figures on his itemized bill.

Even at its best, the new-part problem presents continuous opportunities for disastrous complications. But if handled in the manner suggested, there is an equal, if not greater, opportunity to make it an asset in the repair business instead of the heavy liability it has so often become. The essential thing to be kept in mind is not only to treat the car owner fairly, but to see that he understands that he is being treated fairly.



Individual Lockers Used by Garageman for Storing the Cushions, Tops, Curtains, Carpets and Personal Property Found in the Car When It Is Being Taken Apart for Repairs—These Lockers Are Partitioned in Different Sections to Separate the Contents and Tags or Cards, Bearing the Car Owner's Name, Car Number, and Date of Entry Are Fastened to the Outside—Locks Are Sealed With a Lead Seal, Similar to a Railroad Car Seal, Until the Car Is Finished—A Corresponding Card Is Given to the Customer.



## A Rim Device that is "O.K."

**H**ERE is a new and invaluable tool that takes the heart-ache and backache out of tire changing.

The Duplex Rim Device is universal. It fits any size and make of split rim, straight side or clincher, and operates all of them in the same way. It will unlock and lock any make of rim and do all its work without injury to tire or rim.

A woman can operate it as easily as a man, because it is simple in design and has no clamps or sliding arms to adjust.

The center action of the lever—between the bars and guided by the disk—eliminates all side strain and delivers a straight pull and push. The rolling support of the disk at the bottom makes it impossible for the device to sag while it expands.

Folded, the Duplex Rim Device takes very little space in the tool box. This device bears the famous "Fairbanks O. K." which means O. K. quality, O. K. price, and O. K. Service.

### Sole Distributors for

THE SERVICE STATION EQUIPMENT CO.  
THE HEMPHY COOPER MANUFACTURING CO.  
THE BILT RITE MANUFACTURING CO.  
THE SERVISTOCK SYSTEM CORP.  
THE DUPLEX RIM DEVICE CO.  
THE T & T MANUFACTURING CO.

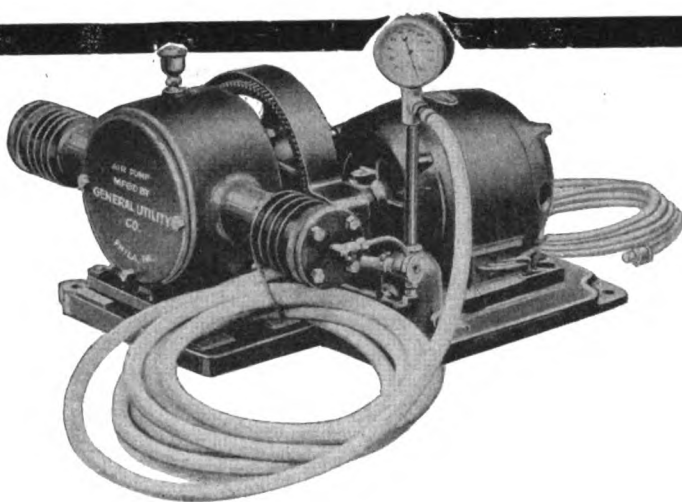
Fairbanks Scales  
Trucks and Wheelbarrows  
Valves  
Engines and Pumps  
Power Transmission  
Mill, Mine and Railway Supplies  
Automobile Repair Equipment  
Lincoln Electric Motors  
Steel Factory Equipment

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THE FAIRBANKS COMPANY Administrative Offices NEW YORK

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Boston	Detroit	Paterson	Scranton	Washington	Glasgow, Scotland
Bridgeport	Hartford	Philadelphia	St. Louis	Havana, Cuba	Paris, France





**T**HE superiority that distinguishes the General Air Compressor is not due alone to the special features of its construction, but is a product of the quality of every detail of its make up. It is a superiority of design and workmanship that shows itself not only in unusually efficient performance but in great economy of maintenance.

The General Air Compressor has been built to give garages and service stations just the air service they need. It will deliver 5,000 cu. in. of air per minute at a low cost for current. And with reasonable care will give years of efficient service.

Our catalog gives full details of the General Utility Compressor Outfits. Liberal Discounts to Dealers.

All our business is done through exclusive jobbers. There is some territory still open.

## GENERAL UTILITY OUTFITS

are designed to meet various service requirements. They are furnished with tank equipment, or for direct inflation, for either portable service or for stationary installation. They are completely equipped ready for use with air gage, safety valve, oil separator and control switch (optional), and furnished with high grade hose, cable and plug.

The General Two-Cylinder Air Compressor, with its gear to gear connected,  $\frac{1}{2}$ -horse, ball-bearing mounted, G-E motor, is the standard compressor unit on all General Utility Outfits.

Its single stage, horizontal opposed two-cylinder construction is the most satisfactory design that has ever been developed.

The cylinders are ground, materially increasing their efficiency. The gear wheel and drive shaft are mounted on a common bearing of the full floating type. This long bronze bearing insures maximum rigidity and minimum wear.

The motor and compressor are rigidly mounted on a common bed plate. The motor is series wound and will start on a load.

### Export Address

**17 Battery Place  
New York, N. Y.**

*Two Cylinder*  
**GENERAL**  
AIR COMPRESSORS

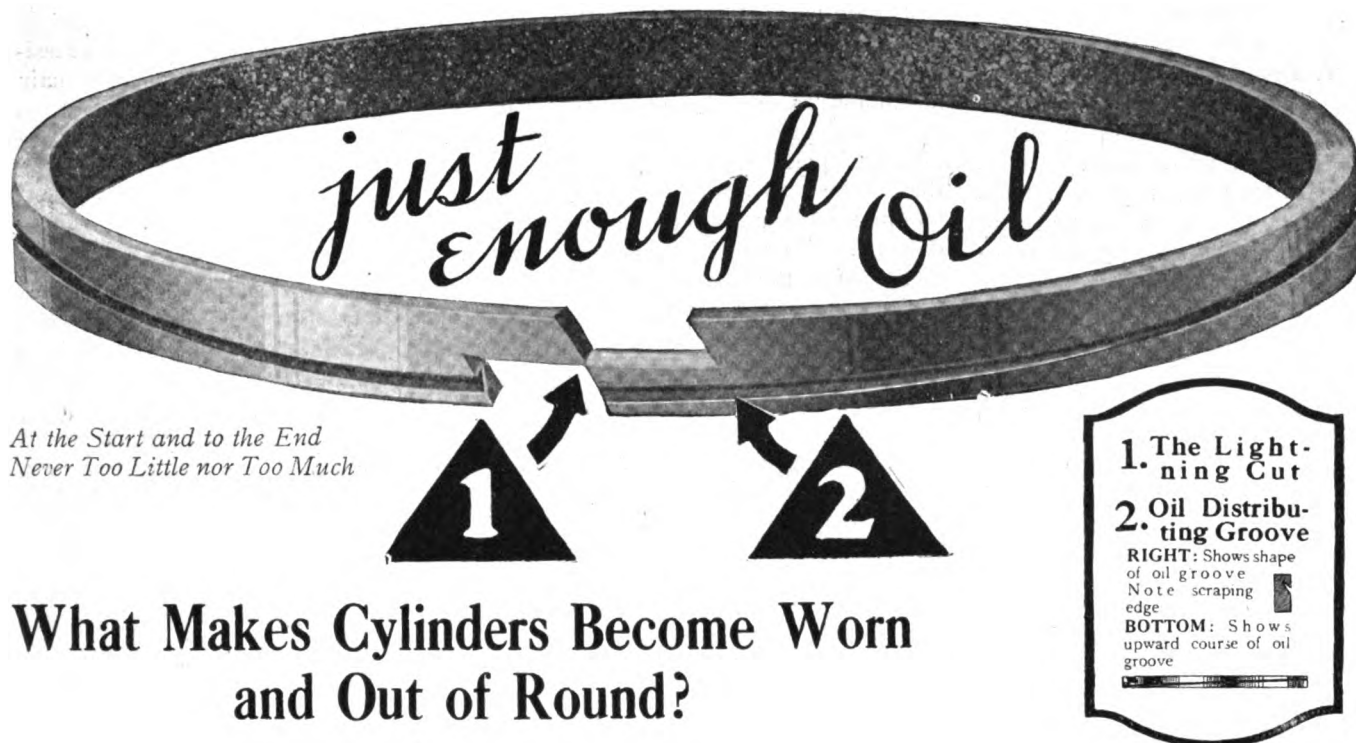
**UTILITIES SALE**

*Sales*  
**GENERAL U**

Factory 1324 Ogden St. Philadelphia - Office

*Utilities that Sell*





## What Makes Cylinders Become Worn and Out of Round?

**B**ONE DRY piston rings! Friction removes tiny molecules of metal. The ring itself loses its original circumference. Oil, denied at the start, rushes through the worn crevices and creates carbon trouble and compression leakage.

The remarkable wandering oil groove of the General Lightning Cut Ring carries oil when and where it is needed most—when the ring is installed and at heretofore unreachable high points on the cylinder wall. It is unlike ordinary straight cut oil grooves.

Preservation of the ring enables the scraping edge of this oil groove to retrieve all excess oil. As a result the wandering oil groove provides throughout the life of the General Lightning Cut Ring "just enough oil" to insure efficient performance and to indefinitely postpone ring failure.

The lightning cut itself, combining as it

does, the old step and diagonal cuts, provides a most effectual control of the compression charge.

**GENERAL LIGHTNING CUT  
PISTON RINGS**

Three other features of design—the individual cast—its concentric shape—and one-piece construction make for

maximum piston ring efficiency.

The dealers, repair shop and garage men, who have waited for a piston ring they could guarantee to give increased power, greater mileage, fuel and oil economy and less friction and wear, are invited to participate with others who have adopted our revolutionary, profit-sharing sales plan in the marketing of piston rings.



# CORPORATION

Representatives

ITY COMPANY

New Stock Exchange Bldg., Philadelphia

Two Cylinder  
**GENERAL**  
AIR COMPRESSORS

*Because They Serve*

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers

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### The "Free Air Pest"

(Concluded from page 23)

before it develops fresh trouble, or do this, that, and the other thing.

He sees the long procession ahead, and he can not know what each is there for. Even so, it takes time to fill four tires with free air, and that time must be multiplied by the number of cars in line there.

"Oh, let's not wait," someone aboard will suggest. "We've gas enough for an hour's ride, and we're sure to come on some place that isn't so crowded. Then we can have them look into the knock and buy that wrench we need, and get the other things we're needing."

So away they speed, while the steady drain on the free-air supply goes on, to the ceaseless wear and tear of equipment that must be repaired every now and then at the garage keeper's expense.

Interesting little device this panacea for the free-air nuisance of the garageman, which is used in Cincinnati. There is, first of all, an attractive, milky-white globe, visible from afar by day, visible even farther away by night, when the light within proclaims the legend, "Air" to the ever oncoming automobile.

At one side of the pedestal of this globe, an attractive blue metal framework has place; this with a little slot for depositing the five-cent piece required for the service. One coin, just about enough to cover wear and tear, will operate the free-air machine, which is intended, more especially, to stop the abuses of this service.

Inside, at the bottom, is a hose which may be drawn to wherever the car may be. A little notch on that hose may be set to indicate one, two, three, or four tires as desired—more than four can not be filled for that nickel.

A neat, well-polished hydrant also takes the eye of the car owner while the air is being served. Water will flow from this, a notice states, so that for the one and the same five-cent piece the machine may be supplied with water.

Air in four tires, since it's being paid for, water, while the opportunity is so handy, both take time, of course. In that time eyes of the car's occupants are on the things about them, even while, mechanically, their owners pour the bucket or ply the air hose.

The cases containing this, that and the other accessory are observed. Neat placards telling prices for overhauling are noted as are also other placards giving the price for painting automobiles and prices for repairs of this or that. The very up-to-dateness of this automatic air-and-water service; the dispatch with which it helps the car owner—for the "free air hogs," as garagemen called them, are gone—appeals to him and the messages of the individual signs sink home.

By and by the garageman is asked this, that, and the other. By and by he is bringing out this, that, and the other novelty and explaining them. For instance, there is a screw cap for tires which does away with the nuisance of the air gage. It whistles the signal when a tire has exactly enough air. It takes just a moment to demonstrate it. And other novelties the garageman shows while, in comfort, and not feeling ever that others are delayed, the whole five cents is spent for air!

Those who have put in the new device are delighted. Those who have purchased of it are delighted with the service as well as with the device. Here and there, as with every innovation, of course, there are conservatives who are still chary about installing it fearing that their customers may call them "cheap," and resent it.

One by one, these will be brought to see the new light also—and then, alas and alack from the motorist's point of view, we may be saying a last and long farewell for all time to the time-honored custom of getting, when and where we will, "Free Air."

### It's Taim to Be a Bizness Man

(Concluded from page 18)

"I want you to prommis me sumthing," Bob sed then. "I want you to prommis me that youl cut the mooveys down to one a weke and save those other 22 cents only put 3 more with em and maik it a qwarter a weke and then spend those 4 hours studying in a bizness book Ile lend you."

Gee, that sounded awful taim to me. I hait a book about bizness and the more mooveys I see, the more bother it is to reed a book. But Bob sed "If you never study the bizness howre you going to get ennywhere? Are you going to be just a odd job boy all your life?" When he put it up to me like that I had to admit he was on the rite side. And he sayz,

"Hav you ever sene ennyboddy in your mooveys get to be a bank pressident or enny kind of a milyunair without studying the job? Not so youd notis it. Get bizzy kid and see if you cant lern sumthing besides the life histry of fatty Arbuckel and Mary Pickford."

I woodent stand for that sort of stuf from everyboddy. If Persy tride enny of that on me, Ide slap his rist and bust his rist watch, but Bob is my frend and hese getting more munny than ennyboddy else on the forse so he ought to kno sumthing about it. I want to be a topnoch sailsmun or a grate mekannic sumday and Bob sayz the way to get there is to studdy it.

I diddent maik him enny prommis but Ime thinking it over and I guess Ile haf to cum to it. I can see that my father thinks I ought to begin paying sum board prettie soon and if Ime going to pay board that wil cost more than the mooveys and Ive got to get to where Ime maiking more munny or sumthing.

Its prettie tuf too becawse theyre just starting "Febo the Iron Man" cereal and Ive sene 1 sho of it and its grate. I gess Ile just go to Febo once a weke and pass up fatty and Mary. Gosh its hel to be a bizness man! But when I set out to be one, you bet Ime going to be one or bust. Ime that way.

Yours to a grees spot,  
BILL.

### Battery Service

(Concluded from page 12)

Next in importance to proper equipment, is management. To secure the very best results, it is necessary that the battery shop be managed more or less separately from the garage and repair departments; otherwise, one will flourish at the expense of the others. To properly establish this department it is best to hire a good man to take complete charge of the battery shop and have him concentrate his entire attention on that work.

The electrical supplies and parts for the batteries can be kept in the main stockroom and issued on requisitions, the same as for the garage and repair departments.

The repair orders should be made out in the battery shop, but payments should be made in the main office where all transactions should be recorded.

# Page of Big Selling Accessories for Ford Cars

Ford owners are interested in getting as much out of their car as possible in the way of service, economy, comfort and safety whether the car is used for business or recreation, profit or pleasure, and those dealers who carry these items in stock will reap the benefit of this demand.

## To Eliminate Rattles

The most dangerous and annoying rattles in a Ford come from the Steering and Radius Rods. Many a noisy Ford would be quiet and steer perfectly if these rods were not loose. The Apco Anti-Rattles are the biggest selling item in the Apco line and no Ford should be run without them. The Steering Rod type sells for fifty cents a pair. The Radius Rod type fifty cents or a dollar for a complete set. Dealers' prices twenty-six cents or ten for two forty.



## To Eliminate More Rattles

The continual use of the steering wheel as a handle to get in and out of the car causes the steering column to work loose and once this happens it rattles and is very apt to



break off. The Apco Steering Column Brace is an attachment that fastens to the steering column and the dash, making the steering column as solid as a rock. It sells complete for one dollar, and once installed the owner would not be without it for many times its cost. The dealers' price is sixty-six cents or ten for six ten.

## Accident Insurance

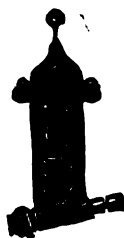
When people unexpectedly step in front of a car it seems as though one could never reach the horn button in its out-of-the-way position under the wheel at the front of the steering post. The more immediate the danger, the more it seems one must fuss and fumble to sound the horn. There is a clever little device that places the horn button in the most natural position at the end of the gas lever, where your finger finds it instinctively and without a second's delay. This is another Apco device. Its price is one dollar and it comes complete, ready to install. Dealers' price seventy-three cents, ten for six eighty.



## Oil Supply

Many Ford owners never know how much oil there is in their car and they will appreciate this new invention which tells them at a glance just where the oil is, even at night. It will not break, it cannot leak and it never tells a lie. It is sold by most dealers, costs one dollar and can be put on in a few minutes with a pair of pliers. Dealers' price, fifty-eight cents or ten for five forty.

Some owners want an efficient oil gauge at a low price and the glass gauge shown will answer the purpose and it has been on the market for ten years. It is very large and with the exception of the metal oil gauge it is the best on the market. Sells complete for fifty cents. Dealers' price thirty-two cents or ten for three dollars.



## Muffler

When the regular Ford Muffler fills up with carbon it cuts down the power and costs money, and a missing cylinder will often cause the Muffler to burst. The new Muffler described will eliminate all of these troubles besides giving the owner a testing valve that will locate a missing cylinder instantly. The complete outfit, including pedal cable and screws sells complete for five dollars. Dealers' price three sixty-five, five for sixteen ninety-five.



## Front Axle Alignment

If the Ford steers hard and will not stay in the center of the road it is because the front axle is out of line and the only way to permanently cure this trouble is to install an Apco Front



Axle Brace or Auxiliary Radius Rod which can be installed in a few minutes with a wrench. It is made from pressed steel and only costs one dollar. Made for both 1920 and earlier cars. Dealers' price sixty-six cents, or ten for six ten.

## Care of Tire Valves

Nothing is more annoying than to find that the valve stem is mutilated, that the inside cannot be removed or the cap or pump connection can-



not be attached. The tool shown is really six tools in one handle and no kit is complete without one. It costs one dollar. Dealers' price, seventy-three cents or ten for six eighty.

## A Cure for Timer Troubles

This is not a new timer and during the past three years thousands have been sold. The elimination of troubles caused by the uneven wear on steel and fibre was the principal object of the designers together with the easy starting



features and the quick, cheap replacement of wearing parts. With each timer two extra springs are furnished and this means timer service for a long time. The price complete is one dollar. Dealers' price seventy-three cents, ten for six eighty.

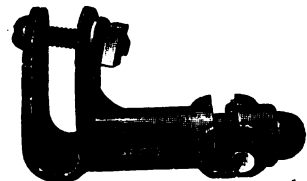
## Renewing Oil Supply

It is hard to replenish the oil without spilling it over the timer wires which will shortly rot the insulation and cause trouble. The breather shown sells for one dollar and is fitted with a screen to keep out dirt. It fastens permanently in place and cover threads on, preventing rattles. Dealers' price sixty-eight cents or five for three five.



## Jazzy Brake Rods

Noisy brake rods are common on the Ford and those owners who prize quietness will welcome the brake rod supports shown in the cut which



are self-lubricating, anti-rattling and everlasting. The installation is simple and a dollar will not buy any more comfort. Dealers' price fifty-six cents, five for two sixty.

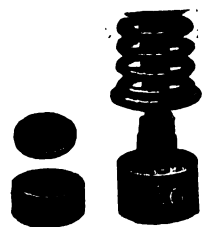
## Broken Crank Case Arms

A broken crank case arm meant a serious thing until the Apco Arm, as shown in the cut, was introduced to the Ford owner. This makes a permanent — better than new — repair in an hour instead of a day and the cost is only one dollar and fifty cents instead of twenty dollars. Most repair men use this but if you want to tear down the engine send to the manufacturer of the arm shown. Dealers' price seventy-three cents, ten for six eighty.



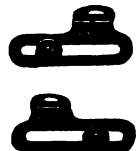
## To Quiet Valves

Most cars have adjustable valves and this is why the higher priced cars are quiet and the Fords are noisy. It is an easy matter to make the Fords adjustable with the valve adjusters shown, which can be installed in a few minutes and only cost fifty cents a set of eight with discs. Dealers' price twenty-nine cents, ten for two seventy.



## Attaching License Tags

A wire around the axle is a common way to attach the front number plate but the license brackets shown only cost twenty-five cents and they hold the plate solid and prevent rattles. Dealers' price fifteen cents, ten for one forty.



The Apco Manufacturing Company, of Providence, is the largest makers of Equipment for Ford Cars in the world and its new catalog should be in the hands of every dealer who wants business from owners who want economy, safety, comfort and efficiency from their cars. Simply drop a postal card and the catalog will be mailed promptly without charge. Most jobbers stock Apco goods. If you have trouble locating a source of supply send us your order and we will have it shipped thru some jobber near to you.

# The Importance of Cylinder Grinding

Grinding Cylinders May Cost More, May Require Special Equipment, but It Pays—It Is the Only Way of Finishing Cylinders—It Improves the Car's Performance, Lengthens Its Life, and Results in Satisfied Customers

There are various ways a piston can be made to fit closely in a cylinder. If the cylinder is slightly out of round and worn, oversize piston rings can be used and lapped in with a grinding compound.

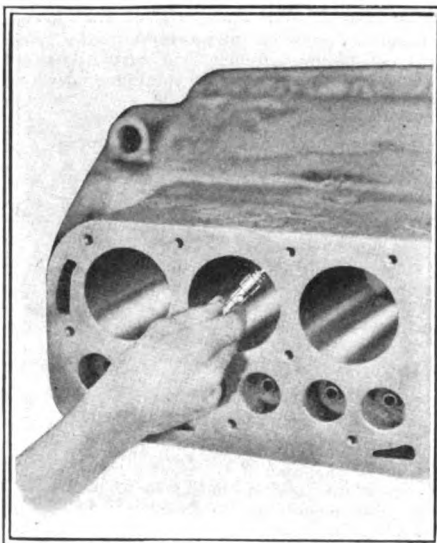
If the cylinders are seriously worn they have to be rebored and oversize pistons lapped in, or the more perfect way taken of grinding the cylinders and then lapping the pistons in.

Some recent photographs, taken at the Mitchell Motors Co.'s laboratory, of cylinder walls, show that the wall of a bored cylinder has a rough surface, a series of projections, like hills and valleys, and that the wall of a ground cylinder is smooth and straight.

With reamed or bored cylinders—the common practice of most repair shops—the projections or hills soon wear off and leave considerable play between the cylinder wall and the piston, and the result is that you have a noisy engine, poor compression, oil pumping, waste of fuel and poor engine performance.

Grinding cylinders is the only practical way of getting smooth, straight, round cylinders; and that should be done to every engine when first made and when repairing an old one. It makes a better engine, and saves money for the owner in the end.

Grinding cylinders increases power, because it permits a closer fit between the cylinder wall and the piston, and prevents



Measuring the Cylinder Diameter.

the loss of compression. Also, the smooth surface of the cylinder offers less resistance to the travel of the piston which cuts down friction and further aids power.

Fuel is saved because more power is delivered for a given amount of gasoline and because there is less possibility of unused gas flowing down past the piston.

Oil is saved because with a perfect fit there is less tendency to pump oil up into the combustion chamber.

The engine operates smoother because

the compression stays equal in all cylinders. There is less chance for piston slaps. Less oil gets to the combustion chamber, and therefore less carbon is formed.

Longer life is obtained, because the piston and cylinder wear to a smooth running fit which is lasting.

Lubrication is improved because the oil in the crankcase is not thinned out by unburned gas flowing down the walls.

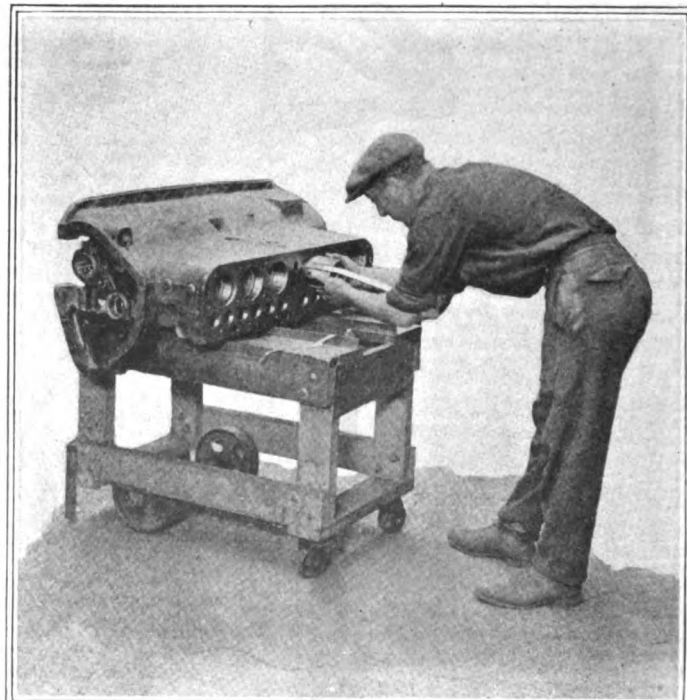
As automobiles, trucks, and tractors come into more use and the owners become educated to their construction, and the advantages and savings which result from having certain things done, as in the case of cylinder grinding, there will be more demand for it.

Even today this demand is frequent and the garageman or repairman who wants to be known for the perfection and reliability of his service—it is well for him to begin thinking of installing the necessary tools to do this kind of work. It pays, and invariably leads to a "Take it to Jones' Garage" advertisement from pleased and satisfied customers and finally results in the establishment of a good trade.

All those who are interested, can obtain a copy of a circular which explains more in detail the benefits of cylinder grinding by writing to the Mitchell Motors Co., Racine, Wis., and mentioning the American Garage & Auto Dealer, Chicago, Ill.



Checking for Straightness.



Fitting Pistons for Exact Clearance.



# Invincible Aprons are Acid Proof

They positively will not check or crack.

Used by leading manufacturers and service stations throughout the country.

Invincible Acid Aprons are made in several sizes and styles and are furnished complete with adjustable neck band and adjustable chain fastener for waist.

Your Jobber carries them in stock.

Ask him for full information.



Split Front Style



Full Front Style

## Specify Invincibles When Ordering

## ***BUILD A BETTER BATTERY BUSINESS WITH THE IBSCO STEAMER and STILL***

Battery service stations everywhere are experiencing the many advantages of IBSCO equipment.

They have made them pay for themselves in a very short time and have built up a better battery business through the more efficient service Ibsco Steamer and Stills have enabled them to render.

You, too, can enjoy these distinct advantages as soon as you install Ibsco equipment. They are simple to operate and can easily remove one or all six battery cells in three to five minutes without injury to the battery in any way.

*Let your jobber tell you more about this equipment or write us direct for further information.*



Under the Sales Management of  
**Bailey-Drake**  
INC.  
**Merchandising Engineers**  
 1120 Michigan Avenue  
 CHICAGO, ILLINOIS



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# A New Idea in Industrial Financing

The plan of the Elgin Motor Car Corp. of distributing its stock among thousands of business and professional people was looked upon four years ago as a doubtful experiment. Today the Elgin company is regarded as one of the most successful and prosperous in the industry. In a report to more than 15,000 stockholders at the company's recent annual stockholders' meeting, President and General Manager C. S. Rieman showed that the company has recently been earning at the rate of from 36 per cent to 54 per cent per annum on its outstanding stock.

The Elgin company's last annual stockholders' meeting, held at its factory, April 13, 1920, was one of the largest gatherings of the kind ever held, there having been 2,167 stockholders present. They were rewarded by an announcement that the company's earnings had been so satisfactory that a 5 per cent cash dividend had been declared for payment out of the earnings for the first three months of 1920 and that, if strikes or other abnormal conditions did not interfere with the company's operations, other dividends would be forthcoming from time to time during the year. It was also announced that, in addition to the cash dividend, a stock dividend would probably be paid in the near future.

As was to be expected with such an excellent showing, the same board of directors was re-elected by acclamation for the ensuing year and a unanimous vote of confidence was tendered the management.

President Rieman, in reviewing the company's astonishing growth from assets of \$100,000 four years ago to present assets of more than \$4,000,000, stated that it was in large part due to the co-operation and

"boosting" of the company's thousands of stockholders who, during the past four years, have helped to sell thousands of Elgin cars. The company, by making these sales at a very low cost for advertising and

of approximately \$30,000,000 per annum.

Four years ago the Elgin company began operations in a remodelled skating rink. From the very beginning, the Elgin's growth was phenomenal. At one time, for



The Elgin Six Hurdling Across a Stream, Covering the Total Distance of 65 Feet.

selling, was thus able to make a larger profit per car.

The annual report showed a steady increase in the volume of business, more than \$1,000,000 worth of cars having been built and sold during the month of March, 1920, and it was stated that only the inability to obtain certain kinds of material prevented doing a much larger business.

The stockholders unanimously voted to increase the capital stock of the company from \$3,500,000 to \$10,000,000. This increased capitalization, providing for large additions to plant and equipment, will enable the Elgin company to do a business

a period of several months, huge circus tents were used to house some of the manufacturing operations. Seventeen acres of land are now owned by the company at 61st street and Archer avenue, Chicago, four acres of which have recently been acquired for further expansion. The actual floor space now occupied is upwards of five acres.

Mr. Rieman's announcement that, notwithstanding the abnormal conditions prevailing, the total volume of sales for 1919 was approximately \$6,500,000 and that business for 1920 is expected to be more than double that amount, was enthusiastically



The Meeting of Elgin Stockholders Was Like a Political Convention With the Contesting and Differences Omitted.

**Thousands of inquiries each month for our FREE game**

Each month we receive thousands of coupons from our advertising requesting the FREE En-ar-co game. Each of these games is a constant reminder of En-ar-co Motor Oil and other En-ar-co products.

Also, we give each En-ar-co dealer a quantity of these games for distribution. He furnishes us with a list of the motor car owners in his locality. We, in turn, write to these owners urging them to call at this dealer's store for a free En-ar-co game.

Thus do we bring these prospects into YOUR store. They get to know you and your store. You know them and their oil needs.

All of which means the building up of a profitable En-ar-co business—a business that will grow with each sale. For an En-ar-co user never changes, and he makes new En-ar-co users.

Get YOUR full share of this ever increasing business. Write us today for full details of our agency plan.

**THE NATIONAL REFINING COMPANY**  
2083 Rose Bldg., Cleveland, Ohio



**En-ar-co Motor Oil**

White Rose Gasoline  
En-ar-co Motor Grease

National Light Oil  
Black Beauty Axle Grease

**THE NATIONAL REFINING CO.,**  
2083 Rose Building,  
Cleveland, Ohio

Gentlemen: Please send me full detailed information as to your dealer plan and advertising helps.

Name.....

Address.....

City..... State.....

I now sell.....

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



received. To one casually observing the meeting it appeared like a big political convention, with the contesting and differences omitted.

### Automobile Jumps Across Stream, Total Distance of 65 Feet.

One of the most spectacular feats ever performed by a motor car was filmed recently near Elgin, Ill., when, as a result of a wager, C. S. Rieman, president of the Elgin Motor Car Corp., caused an Elgin car, running at almost a mile a minute, to jump across a stream 27 feet wide.

The car not only hurdled across the stream at a point about 14 feet above the water, but covered a distance of about 65 feet from the point where it left the ground to the landing place on the opposite side.

Even the seasoned moving picture men held their breath as the car approached the dangerous gap at such high speed, with certain death staring the driver in the face if he failed to jump the entire distance; but the sturdy car—a stock Elgin Six—made the leap for life safely and, after a series of bounds that reminded the spectators of a bucking broncho, came safely to a stop. Notwithstanding the tremendous shock of almost a ton and a half of weight striking the ground at express train speed, there was no breakage of any part of the car, which was afterward driven back to Chicago, where the Elgin factory is located.

Mr. Rieman claims that the Elgin Six is the "World's Champion Jumper" and stated that such tests are often made at the factory in order to demonstrate the rugged durability of the car.

### Motor Fuel Production.

(Continued from page 22.)

Adjacent districts provided the grade demanded is the same. Likewise, districts that are satisfied with motor fuel of high end point generally get it at a more favorable price than similarly located districts that favor a more volatile type of gasoline.

The retail prices maintained in the spring of 1919 in several cities throughout the country show that prices were lowest in the Pacific Coast states and in the Mid-Continent states nearest the producing centers, and highest in the Atlantic Coast and Rocky Mountain states.

The most important thing to note in regard to the price of gasoline is its relation to the price of crude oil. New York jobbers' prices per gallon of motor gasoline and the average prices throughout the country of a fifth of a barrel of crude petroleum for each year since 1903 show that the price of gasoline is dependent on the price of crude petroleum and that these prices are, in general, parallel with the single notable exception for the year 1911, an explanation for which has not been worked out by the Bureau of Mines.

It may be noted also, that since 1916 the

price of gasoline has held practically constant, whereas the price of crude petroleum has increased very considerably. This discrepancy is in part due to the fact that the New York price has held constant, whereas in general throughout the country there has been an increase of 2 to 4 cents per gallon. There is also the fact that an increased demand for other refinery products has permitted the charging of a lower percentage of operating costs against gasoline than was customary in the earlier period.

(To be concluded.)

### Accounting.

(Concluded from page 26.)

spaces ruled for the record of material and parts, the column heads being: Date, delivered by, quantity, part number, article, sales amount, cost and guarantee.

The duplicate copy is the customer's copy and contains all the information and data which is placed on the original. The stub of the customer's copy is a "release" and must be stamped by the cashier before the car is released and is to be detached by the watchman. It contains blanks for the cus-

tomers' name, license number, date, watchman's name and remarks.

The triplicate copy, which is the shop card, is to be attached to the job in the shop. The stub of this copy is divided into two parts. One, the record of the repair work, is filed alphabetically in the accounting department. It has blanks for the name, date delivered, binder number, the amount, and remarks. The other part of the stub is the customer's receipt and contains, in addition to the repair order number, space for putting in the date when the work is to be called for, the type of car and the license number. This check is presented to the service cashier by the customer.

We are showing in this article a form of car ledger leaf which the writer has used with success for the past six years. In the June issue will be illustrated a form of car register, also forms for truck ledger leaf and truck register.

Should our subscribers show by their inquiries that they are interested in a further discussion of garage shop practice and accounting methods, we will continue the discussion in the June issue.

### Penlings from the Pen of Dike

May is here and so are the tourists! Mr. Garageman, are you ready for them?

Now is the time to clean up and paint up; make your garage as inviting to a tourist as a Pullman car is to a hobo. If you advertise every day in the year, about going bankrupt—well, you need never fear. Everybody is joining the Overall Club. Mr. Garageman, you can start a club by having your men wear cleaner overalls.

To most of us getting a trade paper is like getting a letter from home—both are sure appreciated.

Good roads, good garages, good service, and smiles make the tourist glad he visited your town.

Tires went up—that we all know. Mr. Dealer, if you handle "firsts" and standard brands, have no fear folks will not buy them. John Barleycorn has had his day—so have tire "seconds."

Treat traveling men right. They are your best walking advertisements. If you treat them bum, they tell the tourist and he tells his friend to "pass up that grouch."

Mr. Garageman, you haven't nerve enough to go to a hardware store, buy a safety razor, use it six months, then get a new set of blades and take it back to this hardware man and say: "I paid \$3 for this six months ago. have had a set of new blades. I want to trade it to you for a \$5 one. I will pay you \$1.50 to boot." No, you haven't got the courage to do that. But the other fellow walks into your garage with the same proposition on a car he has used a year—and you are fool enough to let him sell you.

What is the difference between a gypsy horse trader and a dealer who can't sell a new car unless he takes in a second-hand one on a trade? Answer: Gypsy horse trader goes on to new fields; garageman eventually goes broke.

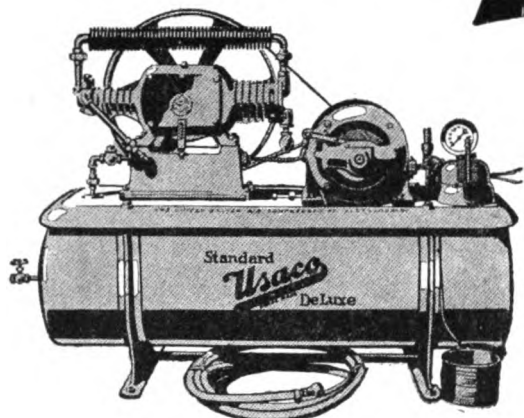
Speaking of the high cost of living: I know one thing that has not gone up—that's smiles. Use more of them every day, and you will keep people coming your way.

In these big national cigar stores when you purchase even a cheroot, the man behind the counter says: "Thank you." Why couldn't you always say "thank you" to every customer? It has been proved that the words "thank you" to a customer mean that they will come back.

This year will be the largest tourist year in history. Keep your garage windows clean, wash up the signs, advertise, and smile—and next fall, as the leaves begin to turn brown and you begin to think of winter, you will look back and say: "Gosh, wasn't this a great season?" Try it!



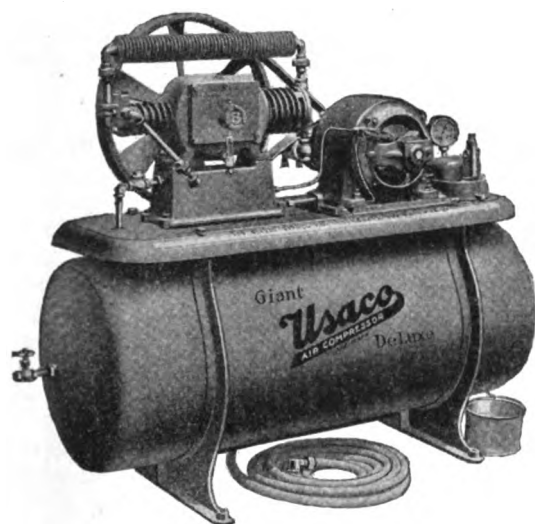
# Two Stage *Usaco* Air Compressors



**The Usaco Standard De Luxe Compressor**  
Capacity 4 Cu. Ft. per Min.

Similar to the Giant, illustrated below, is a completely automatic and self-contained unit of the very highest quality. It furnishes high pressure air suitable for tires of all sizes and pressures, in great volume and is quiet running and foolproof.

Also furnished, if desired, mounted on wheels to provide easy portability.



**The Usaco Giant De Luxe Compressor**  
Capacity, 7 Cu. Ft. per Min.

This unit differs from the Standard De Luxe only in having greater compressing capacity, a more powerful motor and a tank with double the capacity of the Standard. Particularly adapted for the gruelling service encountered in inflating giant truck tires, a service which it handles with remarkable speed and ability.

Also furnished in portable type.

The World's Standard Air Unit for Garages, Gas Filling Stations and Tire Shops;

Built to compete in Quality and Service;

Embody knowledge gained from years of experience and experimentation in building compressors specially adapted for tire inflating service;

Adopted as standard equipment by a number of companies of international prominence, several of whom now have hundreds of Usaco compressors in use;

The Government's choice for war camp service here and abroad;

Incorporate a number of exclusive refinements and patented features;

Deliver high pressure air in great volume without laboring or overheating;

Fully automatic, quiet running and as nearly foolproof as any mechanical device can be made;

Render remarkably dependable service and require only a minimum of attention;

Simple, compact and ready to operate when wired to electric current;

Embody durability and capacity sufficient to render high pressure air service and accommodate rapid growth of business for years to come;

Available in sizes and types to meet all needs.

Please send me literature advertised in margin. My jobber is.....

## The United States Air Compressor Co.

6560 Carnegie Ave.

Cleveland, Ohio.

In writing for literature and prices mention the name of your Jobber.

Inquiries desired regarding our plan of co-operating with Jobbers.

**QUALITY REMAINS LONG AFTER PRICE IS FORGOTTEN**

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Facts and Ideas for the Tire Dealer

## Dallas Tire Men Organize.

By Frank E. Morris,  
*Mgr. Quick Tire Service, Dallas, Tex.*  
"The World do Move."

"Can any good thing come out of Kansas?"

This paraphrasing of scripture with regard to the state of "Soxless" Jerry Simpson was once replied to by an eminent man, now dead. He said that next to Boston, Kansas raised all of the cranks.

Kansas has long ceased to be the butt of jokers.

Some place, somebody or some thing must be the goat, and where the state of Massachusetts and windy Kansas left off doing the blatting, there were other things to take up the burden.

Abuses of all kind are as old as the world, and certainly as old as the automobile tire business. Is the tire business the goat? Tire men everywhere are beginning to see the light of day.

We do not know who originated the idea of a tire dealers' organization, but the idea seems to be spreading. Minneapolis, Memphis, Dallas and Duluth all have a dealers' association of some kind, and a hundred other cities, perhaps prior to and coincident with these, have gone on record by forming organizations.

Memphis, it is understood, through its association has particularly profited by making it impossible for any one to get service or credit from tire houses, if they have not paid their bill to any one of the members of the association according to the terms of that bill. The terms are: "Tenth of the month following purchase."

The deadbeat is catalogued, and naturally will be stamped out, if Memphis keeps up its good record of present achievement. The passer of bad checks to tire men will find the road rocky, and he will no doubt wind up on the highest point of a mountain of rocks, with a hammer in his hand and wearing clothes of a zebraic expression.

The Dallas County Tire Dealers' Association proposes in a constructive manner to bring both dealer and consumer into closer relationship; to prove to the dealer and the consumer that unfair competition is not the life of trade; that cities are built by competition, not by cut-throat methods.

They will bring to the wholesaler an educative influence to prove to him that it is unfair, and certainly poor business, to permit consumers to buy tires from them at a discount, when they are depending for distribution upon the dealer appointed by them, whose business they are crippling, and whose tire influence they are weakening by every such sale.

It is further proposed to exchange ideas about and in behalf of employees, in an attempt to stamp out recklessness, discourtesy to the public, and carelessness in representing their houses.

The jobbers, who are invited to become members of the association, along with the representatives of the rubber manufacturers, see wherein the exchange of ideas will have a stabilizing influence on the business.

The association will not neglect any member of the tire fraternity, no matter how small or how great. All have been invited to become members, and to reap the logical benefits to be obtained by greater constructive ideas.

The dealer with a string of long discounts has always been an upset to the tire business. He is taught wrong, and he teaches his salesman wrong. The motto he has learned and passed along is: "Undersell the Other Fellow."

No more mistaken policy could have been originated. He will be taught to substitute for it: "We Sell Service." The propaganda to be used with him, from an educative standpoint, will be to impress the quality of his goods, and prove his salesmanship, not to weaken at the onslaughts of discount buyers, thereby doing something for nothing, holding himself up to the disdain of the very man who buys the discount rather than the goods, and certainly to the contempt of honest business men, who are trying to make "better business" their motto.

It looks as if the Dallas tire dealers have made an auspicious beginning. "Let's go!" Then we shall see what we shall see.

## Effect of Speeding on Tires, Dangerous and Expensive.

Experiments recently conducted show that the speeder is not only in danger of disaster, but is also speeding up his tire expenditures.

"If the speed mania is so strongly entrenched that the victim cannot desist from the dangerous sport, he should obey two rules if he would avoid the prodigal purchase of tires," says M. D. Bixby, Los Angeles branch manager of the B. F. Goodrich Rubber Co.

"Number one is to drive slowly over rough roads and take turns cautiously. Number two is to increase the pressure in his tires from two to eight pounds above normal.

Special-built tires, such as those used by racing drivers, are required for speeding. The reason for this is obvious to those acquainted with scientific matters. The

faster a tire is driven, the more heat it generates internally. Normal speed will not raise the temperature of the rubber to a dangerous point.

Excessive speed will, however, increase the heat so greatly that additional vulcanization takes place. This dries out not only the friction gum between the plies of fabric, but the very fabric itself, depriving the tire of considerable elasticity, resiliency and life.

The excessive heat, drying out the adhesive friction gum between the plies of fabric, naturally separates them one from another. This results in the fabric chafing and weakening the carcass to a point where it can no longer maintain the air pressure. The result is a blowout."

Mr. Bixby further explains that when a car running at a high rate of speed strikes an obstacle the shock comes so abruptly and forcibly that the rear wheels are usually raised off the ground. During that time the tension is released on the engine and the wheels spin much faster. When they again strike the road, the ground itself must do some brake work and this has an action on the tread of a tire like that of a rasp being rubbed over its surface. It is said that a speed of not more than 25 miles per hour gets the most mileage out of the average new tire.

## Ten Sizes of Tires to Be Retained for Passenger Motor Cars.

Progress is being made along the line of standardization of tire sizes in conformity with the plan proposed by the Rubber Association of America. Those who have cars of unusual sizes will be able to get tires for their cars as long as the cars last, but no new cars will be made calling for any except the standard sizes.

The standard sizes for passenger car pneumatic tires will be 30 by 3½ and 31 by 4-inch cylinder and the following straight sides: 32 by 3½, 32 by 4, 33 by 4, 32 by 4½, 33 by 4½, 34 by 4½, 33 by 5, and 35 by 5 inches.

## Ideal Tire & Rubber Co. Announces an Increase in Its Output.

The Ideal Tire & Rubber Co., of Cleveland, manufacturing Greyhound tires and tubes, announces an increase in its output of 300 tires a day, commencing June 1. This is made possible by an addition to the plant which will be finished by that date.

Additional production is necessary, according to D. C. Hathaway, general sales manager of the company, in view of extensive distribution that has recently been established in the South and West.



## You Can Keep the Polish Bright

*if Buckeye Cleanser is  
used to clean the auto*

**M**OST drivers are particular about their cars. They know that the greatest item of depreciation in the average motor car is in its outward appearance.

They don't want the rich, beautiful polish to be ruined by gritty soap—or alkali.

Nothing but soap will remove grease. But it must be pure soap—without a trace of alkali or grit—if the polish is to be preserved.

## Buckeye Cleanser

is the only soap that fills the bill. It is made especially for highly polished surfaces—designed to clean the surface as well as to preserve the lustre.

It doesn't pay to risk a substitute for use either on your own cars or on the cars of your customers.

*Carried in stock by most jobbers and  
sold by progressive dealers everywhere*

THE DAVIES-YOUNG SOAP COMPANY  
DAYTON, OHIO

*Coast Sales Agents:*

Allied Industries, Inc.

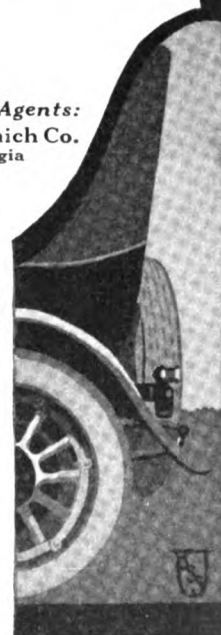
San Francisco Los Angeles Seattle

*Denver Sales Agents:*

Paramount Lubricants Co.  
Denver, Colorado

*Southern Sales Agents:*

The Colley-Minnich Co.  
Atlanta, Georgia



# BUCKEYE CLEANSER

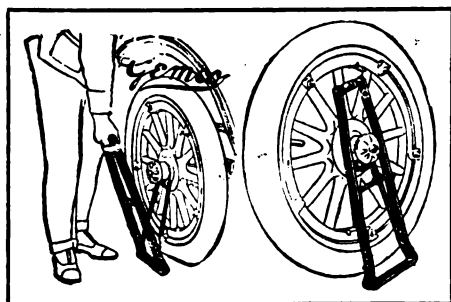
THE AUTO SOAP THAT  
CLEANS & POLISHES



# Garage Equipment for Better Efficiency

## Convenient Tire Saving Jacks Produced by Gemco.

In its Milwaukee factory the Gemco Mfg. Co. is starting the production of a tire saving jack, for which the patent rights were recently purchased from Metzger Bros., of Berlin, Wis. Most garage floors are damp and covered with oil and grease



Convenient Tire Saving Jacks.

which in time will rot the best of rubber. Tires, also should not be left on chains over night. This new jack is designed to keep the tires off the floor while the car is in the garage.

Easily applied and quickly adjusted to fit different size wheels, the new accessories should be particularly valuable. The jack is made entirely of steel, with the exception of the hub saddle, which is covered with heavy harness leather. They are guaranteed to be most durable. A secure lock holds the jack in place when the wheel is raised. They are made in three different sizes. The small-size is adaptable for Fords and other light cars; the next larger for cars weighing 1,800 to 2,400 pounds, and the largest one for cars weighing over 2,400 pounds.

Complete information can be obtained by writing the Gemco Mfg. Co., Milwaukee, Wis. Mention the American Garage & Auto Dealer when you write.

## The Weston Fault Finder for Testing Electrical Equipment.

No matter how well made or how nearly perfect any piece of machinery may be, it will require attention sooner or later. For this reason the garageman must provide himself with proper equipment with which to quickly and accurately search out the trouble.

In presenting to the garage trade its Model 441 fault finder, the Weston Electrical Instrument Co. states that it is placing at the command of the garage owner the ideal instrument for making electrical tests.

The fault finder consists of a voltmeter and an ammeter (two independent instruments) mounted in a compact case with a carrying handle and a hinged cover. All

binding posts have been eliminated. Connection between the apparatus being tested and the instrument is made by means of flexible rubber covered cables having plugs in one end, which fit into receptacles in the instrument, and spring clips on the other end.

The voltmeter has ranges of 0.2 to 3 volts and 2 to 30 volts. With these ranges tests can be made to determine the voltage of the storage battery as a unit or of the individual cells, the cadmium test can be performed, opens, short and grounds can be located, the generator voltage as well as the voltage at any light or the horn, etc., can be quickly measured.

The ammeter has a range of 0 to 30 amperes discharge and 0 to 30 amperes charge rates. It is also used in adjusting the relay, for locating shorts in the branch circuits, etc.

Descriptive literature and prices will be sent to those who write to the Weston Electrical Instrument Co. of Newark, N. J., mentioning the American Garage & Auto Dealer.

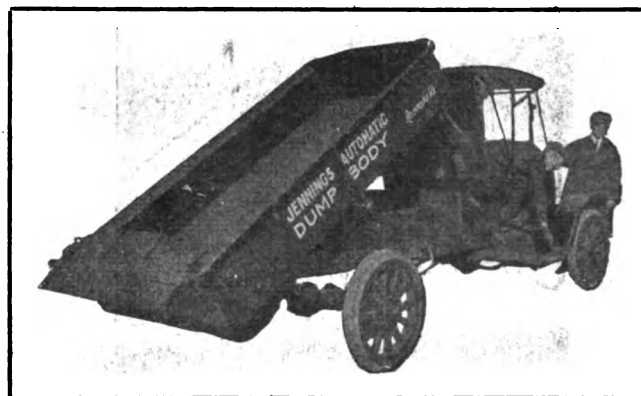
## Gravity Quick-Dumping Apparatus with Special Features.

Real economy in motor haulage is obtained by keeping trucks moving the maximum amount of the working time. An important factor in accomplishing this desired result is in providing adequate facilities for promptly unloading at destination. Among the different types of dumps for this purpose, the Jennings gravity apparatus, manufactured by the Jennings Automatic Dump Body, Inc., presents some unique features.

These bodies are designed and constructed so as to carry the load almost balanced, the center of gravity being somewhat in front of the dumping axle. They are operated by use of a lever working on an axis carrying a fixed arm which connects to the body with a link connection. This lever is so proportioned with relation to the power arm that but 38 pounds pressure is required to dump a three-ton load, when properly loaded. Although the load is concentrated on the sub-frame, it is distributed by the sub-frame to the chassis of the truck in such manner as to give equal bearing.

The advantages of this dump body are its quick action, the simplicity of its work-

ing parts, the clean, clear-cut manner in which it dumps, its comparative lightness and general economy in first costs. Time is a valuable element entering in the economical use of motor trucks and this body,



Gravity Quick Dumping Apparatus.

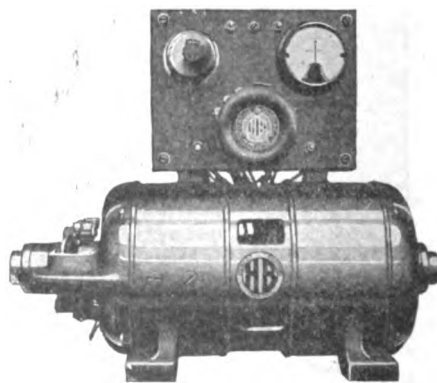
the company says, may be dumped in from five to ten seconds, giving quick unloading.

The iron and working parts are of wrought iron and simple in construction. The body dumps with a thump; therefore it does not require as great an angle of inclination as those which are fitted with a hoist that tilts the body slowly; this also helps it to clean itself each time.

For further information concerning the automatic dump body write to the Jennings Automatic Dump Body, Inc., Roanoke, Va. Mention the American Garage & Auto Dealer when writing.

## New HB, 250-Watt Battery Charging Outfit.

An HB, 250-watt battery charging outfit is the new product of Hobart Brothers Co., maker of battery charging equipment. The outfit has 250-watt capacity, and is said to be capable of recharging from one to



New HB 250 Watt Battery Charging Outfit.

four automobile starting and lighting batteries at one time.

This sturdy little outfit, though much smaller than the other products of the manufacturer, maintains the same special





**D**EALERS who handle Harvey Springs can supply a spring quickly for any make or model of passenger car or truck—a spring specially built for the car for which it is needed.

Harvey jobbers are located in the principal cities, offering a convenient source of supply for dealers in all parts of the country.

That's one type of Harvey Service.

Another is the superior service every Harvey Spring gives.

Breakage is next to impossible with a Harvey—it's guaranteed against breakage under all emergencies.

Guaranteed also against sagging. Yet the Harvey affords an unusual degree of resilience which makes the Harvey-equipped car easy riding and unusually comfortable.



*Write for the Harvey Book—a complete guide for ordering any of the 1500 different Harvey springs. Also ask about the many ways we help Harvey Dealers make sales.*

**Harvey Spring & Forging Co.**  
1045 17th St. Racine, Wis.

features throughout as the rest of the line—ball-bearing equipment, automatic voltage control (allowing different voltage batteries to be charged at the same time), ample capacity for the rating, and a complete panel board, mounted on top of the motor generator. The outfit is especially designed for the small garage, and the manufacturer guarantees that it is easily installed and easily operated.

Hobart Brothers Co., Troy, Ohio, will be glad to send complete information and trade prices to those writing it mentioning the American Garage & Auto Dealer.

### Unitype Quick Change Automobile Signs for Listing Used Cars.

"You know how vitally important it is, to turn your used cars quickly into cash and how it crimps your bank account if you don't," says the W. C. Clark Co., manufacturer of Unitype quick-change bulletins for listing used cars.

Many a time, way back in the garage, you have the very car some fellow is looking for but you let him go by without telling him you have it there. Unitype signs were designed to serve this purpose. They are metal signs with metal interchangeable letters, so constructed that any working or arrangement of letters may be set up quickly and easily and changed at will with-



A Quick Change Used Car Sign.

out any additional cost after the first purchase price.

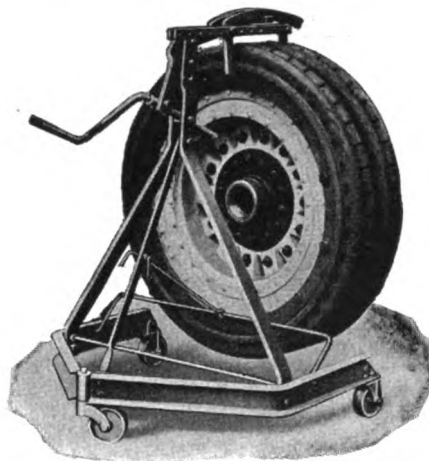
The sign surface is made of a special velvet finished metal, enameled and baked. Each unit bar on which the letters are hung, is entirely separate, preventing the collection of moisture and thus avoiding rust.

The frames include both wood and metal. The regular finishes in wood are mahogany, oak, white enamel and gilt. Letters are lithographed on metal with baked enamel finish.

Quality and perfection in all details with the best workmanship, materials and finish is guaranteed by the maker. Descriptive literature and trade prices will be sent to those writing the W. L. Clark Co., 115-117 Nassau St., New York City. Mention the American Garage & Auto Dealer when writing for this information.

### New Crane for Removing Heavy Motor Truck Wheels.

The new Atlas wheel crane, distributed by the Thomson Auto Specialties Co., fills a long-felt want in garage and service



Crane for Removing Heavy Truck Wheels.

stations where it is necessary to handle the heavy wheels of motor trucks. Without some such appliance as this three or four men must frequently work for an hour or longer with makeshift tools to remove or mount a heavy truck wheel. The Atlas wheel crane, the maker says, operated by one man, will do the work in one minute, exclusive of time required to jack up the truck and take off hub cap, axle nut, etc. This means a considerable saving in labor and idle truck time, in greasing wheels or giving attention to brakes and bearings.

The operation of the crane is extremely simple. Brought up to the wheel the grab hooks reach under the fender and grip the rim on either side of the wheel. A turn of a crank is all that is necessary to lift the wheel so that it hangs free. The crane and the suspended wheel are then rolled back from the truck. An adjustable stop on the crane holds the wheel in vertical position so that when repairs or adjustments are completed, the wheel is slipped back into place in the same easy fashion and the grab hooks are released.

That the construction is powerful, the workmanship of the highest type and the entire device adjustable to any size of wheel or tire, are additional features.

The Thomson Auto Specialties Co., Columbus, Ohio, will send descriptive literature and additional information about its

products to those writing to it, mentioning the American Garage & Auto Dealer.

### Test Stand and Tools for Repairing Radiators.

With the Fairbanks radiator test stand and radiator repair outfit garagemen and repairmen should have no trouble in making all kinds of repairs.

The test stand is all metal and will test the largest radiator on the market, it is said. There is a gage and safety valve for air tests, hence a definite pressure is obtainable with perfect safety. The water tank may also be used for tire testing and will accommodate tires of any size.

The radiator repair outfit is designed to accompany the test stand and contains all of the tools and special devices necessary for making radiator repairs.

Write to the Fairbanks Co., Broome and Lafayette Sts., New York City, for complete information and prices.

### LEGAL NOTICE.

Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of August 24, 1912.

of The American Garage & Auto Dealer, published monthly at Chicago, Ill., for April 1, 1920.

State of Illinois, County of Cook, ss.—Before me, a notary public in and for the state and county aforesaid, personally appeared S. R. Edwards, who, having been duly sworn according to law, deposes and says that he is the editor of The American Garage & Auto Dealer, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:

Publisher—American Garage & Auto Dealer, Inc., 116 S. Michigan Ave., Chicago, Ill.

Editor—S. R. Edwards, 116 S. Michigan Ave., Chicago, Ill.

Managing Editor—S. R. Edwards, 116 S. Michigan Ave., Chicago, Ill.

Business Manager—J. R. Hastie, 116 S. Michigan Ave., Chicago, Ill.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock): H. D. Fargo, 116 S. Michigan Ave., Chicago; J. R. Hastie, 116 S. Michigan Ave., Chicago; S. R. Edwards, 116 S. Michigan Ave., Chicago; I. B. Lipson, Fort Dearborn Bldg., Chicago; J. W. Hastie, 26 S. Hamlin Ave., Chicago; E. C. Hole, 431 S. Dearborn St., Chicago; S. G. Levy, Fort Dearborn Bldg., Chicago; E. T. Clissold, 327 S. La Salle St., Chicago; R. S. Clissold, 327 S. La Salle St., Chicago.

3. That the known bondholders, mortgages and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: (If there are none, so state).—None.

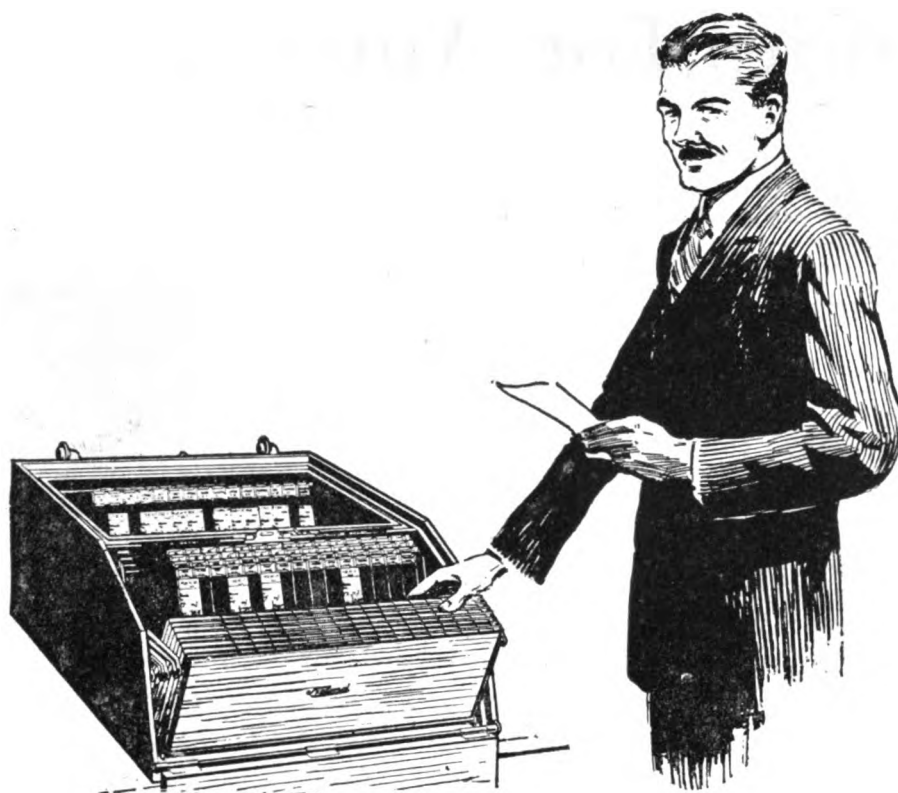
4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is: (This information is required from daily publications only.)

S. R. EDWARDS,  
Editor.

Sworn to and subscribed before me this 31st day of March, 1920.

(Seal.) E. V. CROSS.  
(My commission expires Oct. 24, 1920.)



## The common-sense way of handling credit accounts

**M**ERCHANTS in 182 different lines of business are using the N. C. R. Credit File.

These merchants have found that the file gives them the common-sense way of handling credit accounts.

It is a one-writing system. It eliminates book posting of accounts.

It keeps each day's credit business separate.

It prevents forgetting to charge goods sold on account.

It prevents neglecting to credit money paid on account.

It gives each charge customer a statement of account on every purchase.

It protects every credit record until it is paid in full.

It saves time, work, and worry. It stops leaks and saves profits.

### Investigate this common-sense way of handling credit accounts

~~~~~ FILL OUT THIS COUPON AND MAIL TODAY ~~~~~

Dept. 25, The National Cash Register Company, Dayton, Ohio:

Please give me full particulars about the N. C. R. Credit File way of handling credit accounts.

Name \_\_\_\_\_

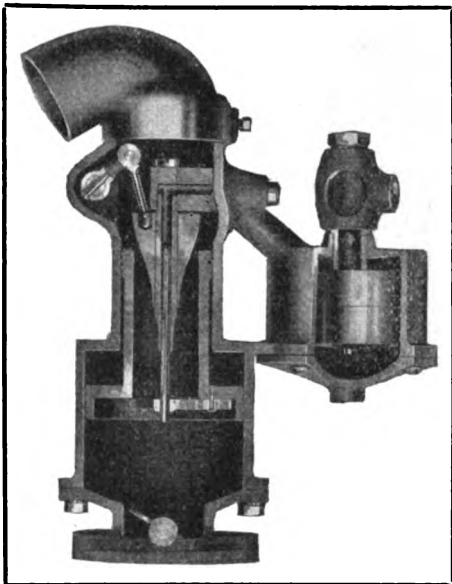
Business \_\_\_\_\_

Address \_\_\_\_\_

# Accessories For Automotive Trade

## Booty Carbureter Embodies New and Exclusive Principles

A carbureter, new in principle, strikingly simple in construction, and possessing exclusive and distinguishing features, is being



**Booty Carbureter Has Distinctive Features.**

ing placed on the market by the Booty Carbureter Co.

A distinctive feature in the Booty carbureter is the fact that it has but one adjustment and that is on the instrument board of the steering post of the car.

The function of this control is to lift the cone which automatically causes the piston to raise away to maintain its fixed and constant vacuum. The piston is at the same time raising the metering pin which increases the depth of the fuel orifice. For further particulars write the Booty Carbureter Co., 21st St. and Wabash Ave., Chicago, mentioning the American Garage & Auto Dealer.

## The Universal Gasolene Purifier for Routing Carbureter Troubles.

The carbureter is acknowledged to be one of the most sensitive parts of the power plant. Most carbureter troubles are caused by poor fuel which, after leaving the refineries is subjected to abuses that allow water, dirt and other insoluble products to enter the fuel.

Tampering with the carbureter to locate trouble often misplaces the float, bends or sticks the needle valve, changes the petrol lever and gets the carbureter out of adjustment.

"The only way to stop the carbureter troubles—and the right way—is the installation of a universal gasolene purifier," states the Universal Gasoline Purifier Co.

The gasolene purifier is a device made of aluminum and is installed close to the carbureter. It is so designed to remove all water, dirt and insoluble products, and give a purified flow of gasolene to the carbureter. It cannot clog and is easily cleaned, its manufacturers state, and can be installed on any automobile, truck, or tractor, or any other internal combustion motor using gasolene or kerosene as a fuel.

If you want to know the many talking points of the Universal gasolene purifier, write the Universal Gasoline Purifier Co., 415 Associated Service Bldg., 258 Main St., Buffalo, N. Y. Descriptive literature and trade prices will be sent upon request. Mention the American Garage & Auto Dealer in writing for this information.

## Practical Products for the Trade Marketed by Bailey-Drake Co.

Ever since garages and service stations have been in existence there has been a constant demand for a genuine acid-proof apron, one that would absolutely stand up under rough usage. The Bailey-Drake Co. is now supplying this demand with the Invincible acid-proof apron—an apron furnished complete with neck tape and an adjustable chain fastener for the waist. It is made in various sizes to suit all needs and the manufacturer guarantees that the fabric will not crack or scale.

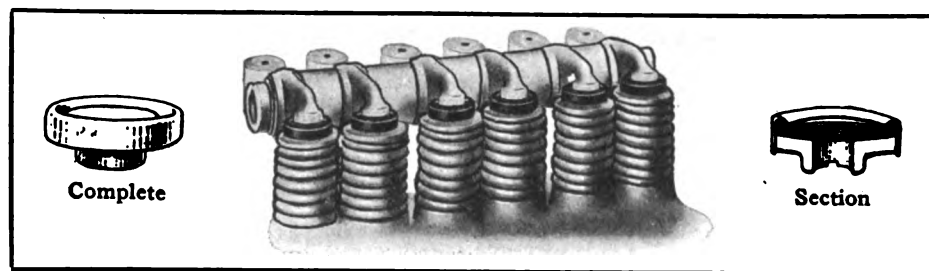
Among the other products which the Bailey-Drake Co. is supplying to the trade is an oil cushion tappet, a practical, easily-applied device for preventing noise in overhead valves. The oil cushion tappet consists of a solid base which fits snugly over the top of the valve stem. On this

forced out on each stroke. It is plain that when oil cushion tappets are applied to overhead valves, they become as noiseless as a finely adjusted side valve motor.



**The Invincible Acid-Proof Apron.**

The Bailey-Drake Co., 1120 South Michigan Ave., Chicago, will give trade prices and full particulars to those who write. Mention the American Garage & Auto Dealer.



**Oil Cushion Tappets for Preventing Noise in Overhead Valves.**

base, rest two vanadium steel dished springs forming a full elliptic spring held in place by a steel cap. The cap is filled with oil.

When the motor runs, this oil is drawn between the springs on the upstroke of the valve, and as the rocker-arm strikes, it hits on a cushion of oil. A portion of the oil remains within the container at all times—the excess being taken in and

## Westinghouse Union Battery Co. to Manufacture Storage Batteries.

The recent organization of the Westinghouse Union Battery Co., in Pittsburgh, marks an important new entry in the field of storage battery manufacture. The new company will produce storage batteries for every industry in which batteries are used. They will specialize in starting and lighting




**BRUNNER**

## MANUFACTURED VS: ASSEMBLY

Brunner Air Compressors are not a mere assembly of parts, made in many different places and arranged together. They are designed, manufactured, tested and finished under one roof by skillful mechanics, using every modern appliance and a complete complement of special tools and gauges made for the purpose. Many of these men have worked for years on the same exacting tasks. The special facilities have been gradually developed for their assistance and for standardization of the product.

As a result, Brunner products are the choice of purchasers who recognize accurate, standardized construction as the basis of long service, economical operation and dependability. They value these basic virtues above short-lived, spectacular performances.

### Brunner Manufacturing Co.

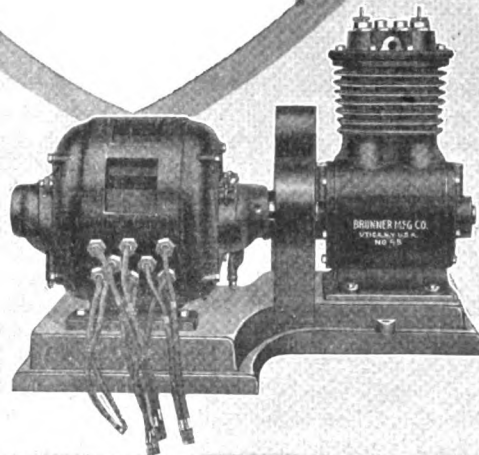
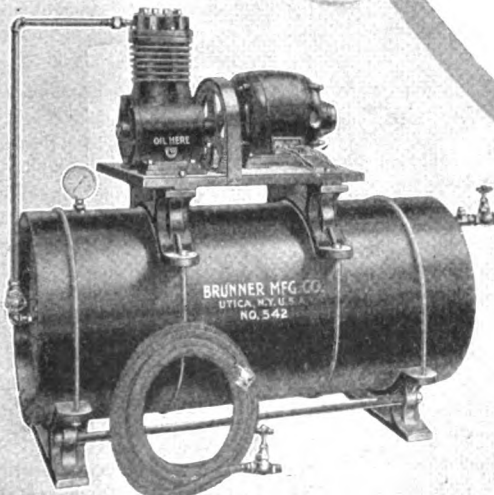
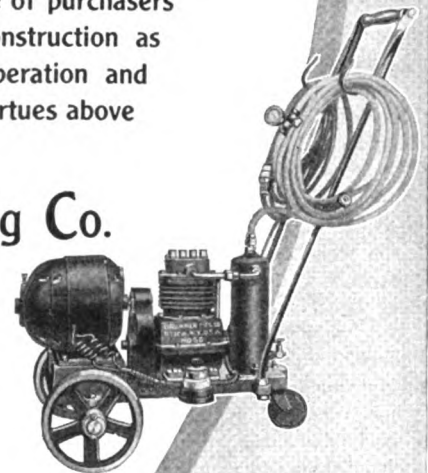
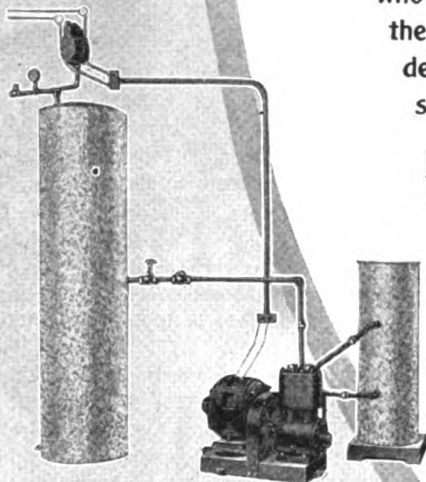
Works: UTICA, N. Y.

Sales Offices:

Utica, N. Y.

Cincinnati, Ohio.

Kansas City, Mo.



batteries for renewal in automobiles, although their complete line will include batteries for trucks, tractors, motor boats, and airplanes; also for home lighting systems, train lighting, and railway signals.

Westinghouse Union batteries are designed on original lines which combine simplicity of construction and unusual endurance. Certain processes in their manufacture which are a departure from methods now in use will, it is said, assure refinements of construction, more perfect inspection, and consequent added reliability.

The company's initial production will be from 1,200 to 1,500 batteries a day and its employees will number about 500. Plans for a large new factory are now being made.

At the present time the sales department of the new organization is perfecting its sales organization by securing district distributors. Each district distributor will be known as a battery service company with some descriptive title, indicating the territory covered. These companies will establish and operate their own branches and organize their own service staffs.

### Special Devices for Comfort and Convenience of Ford Users.

Economical devices for Ford cars are specialized in by the Ford Necessities Co. The company's principal line consists of Ford relief springs made in four different styles and weights.

They are sold so as to give just the right weight-carrying capacity essential to the individual car in accordance with the work demanded. For instance, if a taxicab, running light, were to be equipped, a spring would be offered which would not only stop side tilting, shearing off the center bolt and damaging the tires from bumping mud guards and from extra weight thrown thereon in turning corners, but also act as a shock absorber and weight carrier when the car was loaded, elevating the rear fully two inches.

These relief springs are what their name implies. They work as an auxiliary to the Ford camel-back spring when loads or conditions demand relief.

In addition to relief springs, the company makes an external hub emergency and foot brake that is designed to eliminate the dangers of having no reliable wheel brake on the Ford and to save the burning-out of the transmission hand brake.

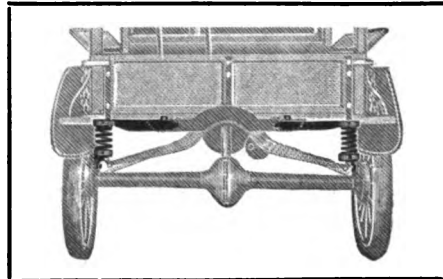
Running board and fender truss rods are also marketed by the company. These are simple attachments for the Ford that are said to at once overcome the sagging of cross truss brace rods by drawing them up to their natural positions.

Write to the Ford Necessities Co., 7 East 42nd St., New York City, for illustrated folders and trade price.

### Model Wheel Carrier Designed for All Makes of Wire Wheels.

The motorist of today is more than cognizant of the necessity of extra tires, and now with the growing popularity of wire wheels, comes the call for wire wheel carriers, a carrier that is theft-proof, void of rattle, quickly and easily adjusted, and strapless.

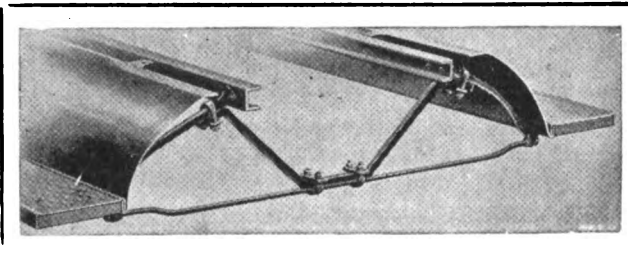
The New Era Spring & Specialty Co. manufactures a wheel carrier, under its



A Practical Relief Spring.

trade name of "Better," for all models of Fords as well as the Chevrolet 490, for all makes of wire wheels. The carrier is made of steel throughout, angles being used where stress is greatest. It can carry several times the required weight, the maker says. The lamp extension is so designed as to be a rigid support of both lamp and license plate. The positive lock makes the tire in no danger of being removed by deflation.

Complete details concerning this modern, model carrier can be obtained by writing



Special Running Board and Fender Truss Rods.

to the New Era Spring & Specialty Co., Grand Rapids, Mich. Don't forget to mention the American Garage & Auto Dealer when you are writing.

### Steel Spring Piston Rings for the World Weary Fords.

We have often wondered what becomes of the old cars, especially Fords. We now think we know.

The manufacturer of automobile accessories, such as carbureters, piston rings, spark-plugs and the like puts them back in service by bringing out sort of "first-aid-to-the-injured" devices which the "about-to-junk-it" car owner is induced to try out by the "wide-awake" garage and repairman, and "Henry" or "Mary Ann" finds itself back on the job once more, minus the spitting and the coughing, the groans and the rattles.

A letter was recently received by the Steel

Spring Piston Ring Co., saying among other things:

"A customer of ours came in one day with an old Ford taxi and told us to junk it. The car certainly looked ready for the junk pile. The cylinders leaked oil, and the plugs had to be changed several times a day. The car had next to no compression or power and you could hear the pistons slapping a block away. He was disgusted with it.

"Your salesman came in about that time and asked us to try one of your rings in the worst car we had in our shop. We went him one better; we put them in the worst car in Scranton.

"The result? The customer took the car back. He is running around the city now doing stunts with the same old Ford taxi he told us to junk. He says the car is better than most of the new ones. Climbs the hills with the best of them. He has almost doubled his former mileage on gas and oil."

The Steel Spring Piston Ring Co., Brooklyn, N. Y., will send complete information concerning its well-known 3-A rings to those writing for it and mentioning the American Garage & Auto Dealer.

### Porter Safety Neutral Stop for Ford Cars.

The Porter safety neutral stop applied to a Ford makes stopping as natural and easy as with any other car—George G. Porter, the manufacturer, claims.

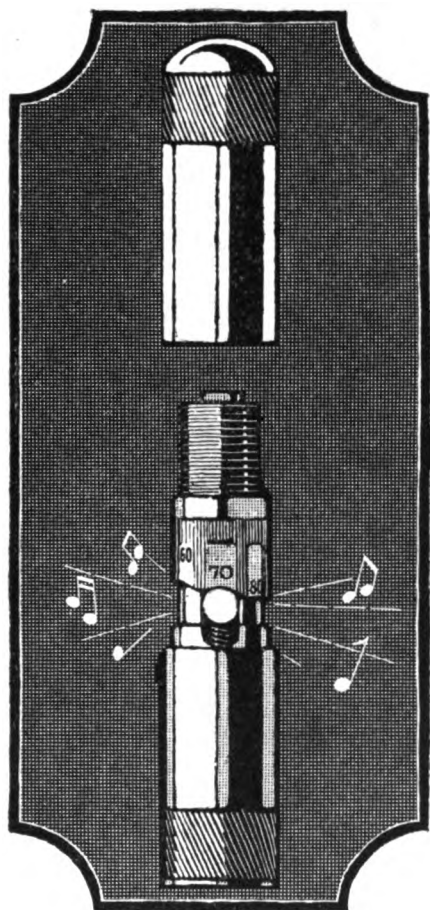
There comes a time in the life of every motorist when a quick stop means the difference between perfect safety and accident. In the excitement, the natural tendency is to jam both foot pedals forward with full force. To do this in a Ford car is to make the impending accident almost inevitable.

The new Porter stop allows the driver to push both feet forward without the least danger of the clutch lever going past neutral into low gear.

This stop consists of a steel plate which is screwed to the floorboard of the car and an attachment provided with a stop member and release latch which is fastened to the clutch pedal lever. When the clutch pedal is in neutral position, the stop member fetches up against an obstruction which is a part of the floor plate, and the clutch lever is prevented from going over into low gear.

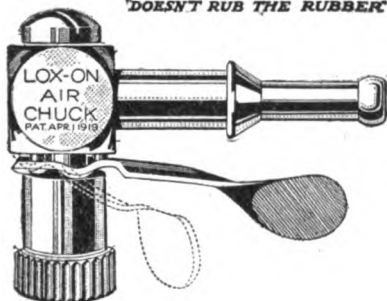
To push the clutch lever further forward, or into the low gear position, the foot is rocked forward and upward until the toe presses against the release latch which extends slightly about the pedal. This raises the stop member above its abutment and it can then be thrown forward in the usual manner.

Write to George G. Porter, Keith Theatre Bldg., Syracuse, N. Y., for more detailed information; mention the American Garage & Auto Dealer.



**Whistler**  
TRADE MARK  
*"IT WHISTLES WHEN IT'S HAD ENOUGH"*

**LOX-ON**  
TRADE MARK  
**AIR CHUCK**  
*"DOESN'T RUB THE RUBBER"*



*You don't have to PUSH the Lox-on Chuck down over the valve. It slips over it and then GRIPS IT! That's why the rubber lasts indefinitely and it is absolutely guaranteed not to leak. You will appreciate the marked improvements in this new air chuck. It saves electric bills, cuts down wear and tear on pumps and increases the efficiency of your air hose connection many times over. Write us for details. \$3.00 each.*



***"You're Safe, Now!"***

**W**HEN your Whistler Pressure Regulator announces *enough*, you can spin merrily along your way. No danger of blow-outs from over-inflation or give-outs from under-inflation.

The Whistler is one of the best and most convenient accessories ever invented. Simply screw it on the tire valve. Set it for the pressure desired. No worry with gauges or guesses. Every time you attach the air-hose, the Whistler gives warning when the tire pressure is O. K. You can't put any more in.

Every automobile man knows that this means a saving of 50% to 75% on tires and a correspondingly large saving in gasoline and time and trouble.

Whistlers are splendid sellers. You're safe with an investment in this profitable line. Quick turnovers and generous profits are sure to come. We will be glad to write you about our advertising and dealer helps. Ask your jobber or write us. \$4.00 per set of four.

**Automatic Safety Tire Valve Corp.**

**1753-1755 Broadway, New York City**

**Factory: Long Island City, New York**

# News of Manufacturers and Jobbers

## Utilities Sales Corp. an Organization for Progressive Service.

"Make no distinction between one customer and another—make no special inducements for one customer as against another."



President Erlichman Believes in Aggressive, Sound Business Policy.

This has been the basis of sound business policy which has helped to carry the Utilities Sales Corp., sales representative of the General Utility Co., to its present commanding status in the automotive industry.

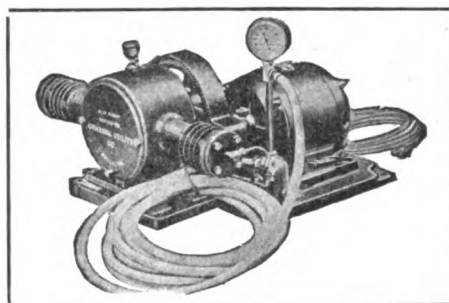
And the success of the organization whose air compressors and piston rings are known internationally, has in no small measure been due to the aggressiveness and ability of its present president, Robert I. Erlichman. Mr. Erlichman entered the automotive field in 1908 when the automotive business was still a game, and after six weeks as a combination stock clerk, shipping clerk, and store salesman, was put out on territory in a selling capacity.

"Being a restless spirit," says Mr. Erlichman, "though bearing in mind the axiom that 'a rolling stone gathers no moss,' I kept rolling in the business. While I did not gather a great deal of moss, I did gather a great deal of experience which has helped me considerably. My experience has been varied as I was a salesman, a purchasing agent, and sales manager before I reached my present position."

Associated with Mr. Erlichman, and an equally vigorous individual, is Samuel H. Bessan, secretary and treasurer of the Utilities Sales Corp. Mr. Bessan became engaged in automotive work in 1911, covering the greater part of the eastern states

where he reported on road conditions for various automobile clubs and the A. A. A. In 1914, he entered the merchandising field of the industry and in 1918 became associated with the Utilities Sales Corp.

The Utilities Sales Corp. claims that the compressors which it is marketing sell because they serve clear, cool air to the tire at a very low cost. The direct stationary model is said to have proved to hundreds of garages that the single stage, horizon-



General Two-Cylinder Air Compressor.

tally-opposed two-cylinder construction is one of the most efficient designs ever developed. The Victor model is also said to be very satisfactory, especially where air storage is necessary.

Another product which is meeting with high favor is the lightning cut, concentric piston ring which is guaranteed by its manufacturer to be productive of more power,

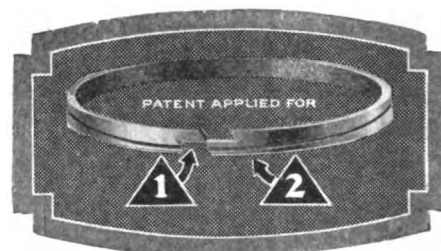


Secretary Bessan Has Had Years of Experience in Automotive Work.

more mileage, less oil, less fuel, less friction, and less wear. The ring is a scientific combination of the old step and diagonal cuts. When expansion creates a crevice in the diagonal cuts, the horizontal cut locks

tight, maintaining a tenacious grip. Natural wear between rings is reduced to a minimum. The complete ring is individually cast, of concentric design, and one piece construction.

The "Utilitarian," the snappy house or-



General Lightning Cut Piston Ring.

gan of the Utilities Sales Corp., published in the interests of jobbers and dealers in automotive equipment, contains many items of vital importance to the trade. Copies will be sent regularly to interested garages, repair shops and service stations writing to the Utilities Sales Corp., 811-12 New Stock Exchange Bldg., Philadelphia, Pa. Mention the American Garage & Auto Dealer when writing for copies.

## Apco Mfg. Co. Dedicates 1920 Catalog to Trade.

For 12 years the efforts of the Apco Mfg. Co. have been directed towards the development of a superior line of equipment for Ford cars to be marketed through legitimate jobbing channels.

It is to the betterment of this service that it dedicates its 1920, 110-page catalog. Bound in blue-gray, filled with good, clean-cut illustrations, the book is sure to be both attractive and interesting to all garagemen.

Among the products illustrated are accelerators, anti-rattlers, brake rod supports, breather pipes, crankcase arms, energizers, exhaust pipe fittings, gasoline gages, and horn buttons.

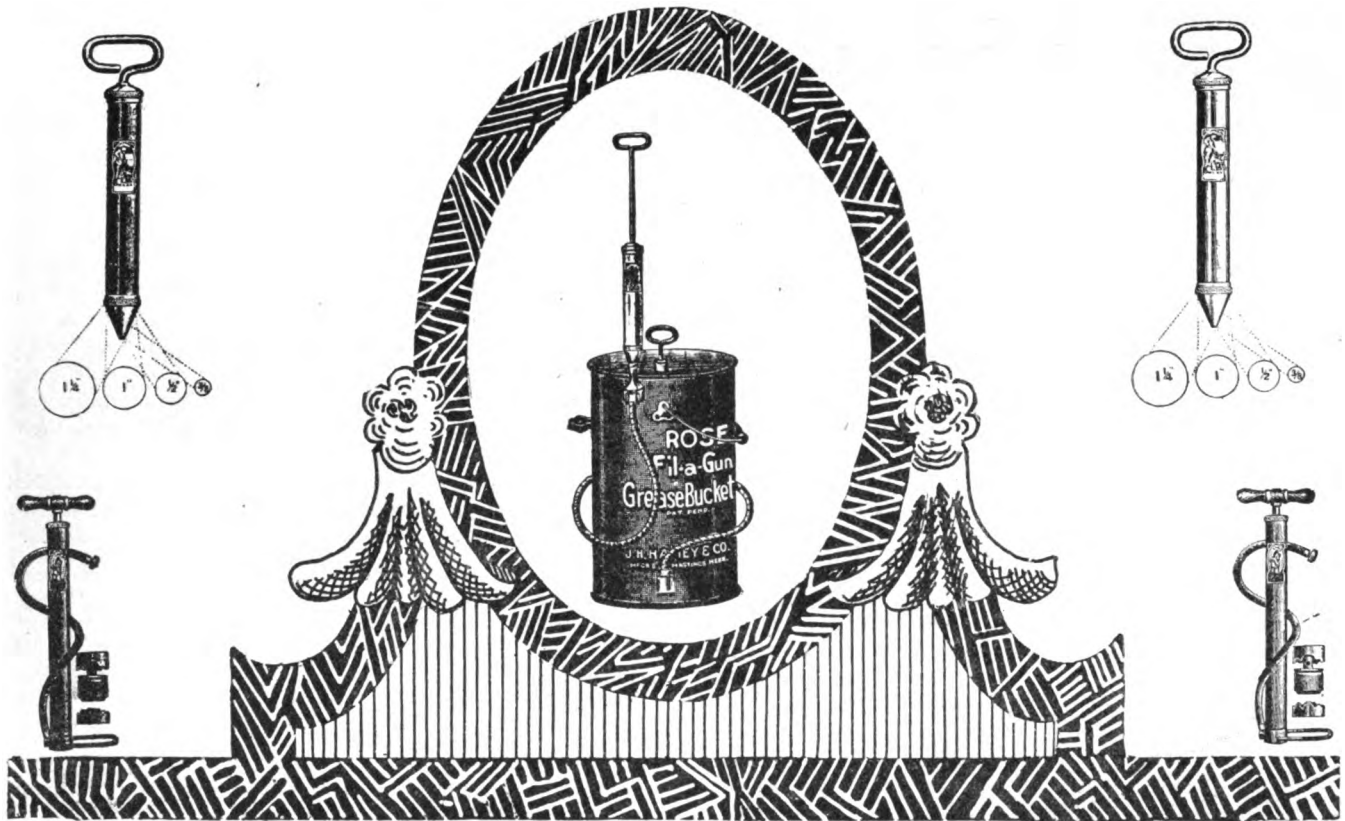
The catalog will be sent upon request. Write to the Apco Mfg. Co., Providence, R. I., and mention the American Garage & Auto Dealer when you are writing.

## M. Chas. Schweinert Elected President of A. Schrader's Son.

It is announced that M. Charles Schweinert, who entered the employ of A. Schrader's Son, Inc., 34 years ago in the capacity of office boy and who has been associated ever since with the growth and development of that concern, has been elected president of the company.

It was due to Mr. Schweinert's initiative





## Rose Products Please

Of more than 2,000,000 **Rose Tire Pumps** in use today, only 44 were returned for replacement in 1919.

Each Rose Product is the best of its kind.

The **Rose Grease Gun** is the gun with the taper nozzle, which fits any opening from  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches—fits so tightly that grease can't back out around the nozzle when the gun is discharged.

The **Rose Fil-a-Gun Grease Bucket**

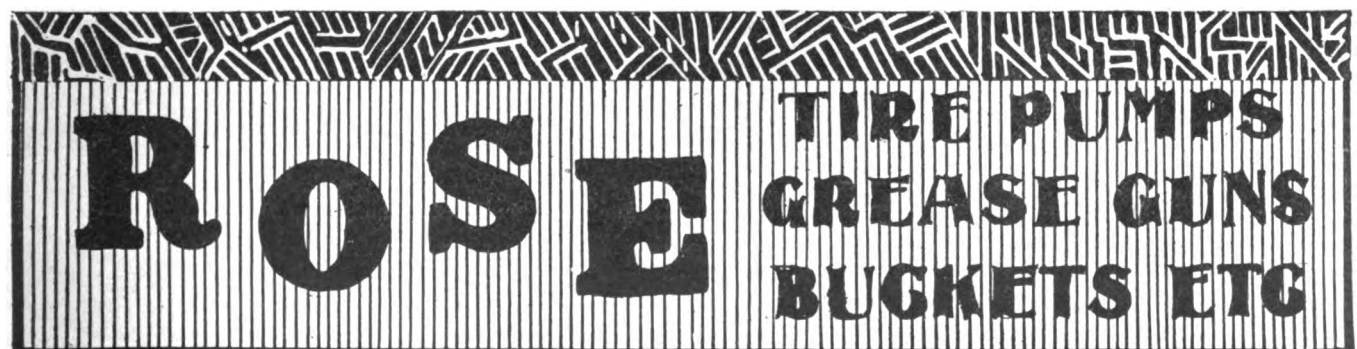
does what no other grease bucket on the market will do—pumps direct to the car or fills a grease gun. Made in lengths for autos, tractors and shop.

**Rose Tire Pump Hose**, the best that can be made, is sold with all connections fitted—a great convenience and time saver for both dealer and user.

Rose products are sold through the jobber and dealer. They are giving satisfaction to the users and are money makers for the dealer.

**Frank Rose Mfg. Co., Hastings, Nebr.**

(Formerly J. H. Haney & Co.)



that the company's export department was established and he has been an active contributor to every improvement in the manufacture of tire valves, every saving made in the cost of their manufacture. Mr. Schweinert is also credited with the development of the Schrader sales policy which is based upon a license agreement and designed to permit the smallest dealer to reap the same profit through his sales as the dealer in large cities.

### Cloud Accessories Corp. New Organization in Automotive Field.

Morgan cord fan belts, silverlining for Ford transmissions and Cloud "75" spark-plugs will be some of the specialties sold by the Cloud Accessories Corp. of Chicago, which has been recently organized. The goods are now in production and shipments will soon be made.

The Morgan cord fan belt is built on the principle of a cord tire with a series of small cords next to the wearing sur-



Kenneth G. Cloud is a Successful Automobile Accessory Man.

face, and five larger, heavier cords bordering the outer surface, all encased in rubber fabric. The cords are said to give the fan belt unusual strength and the rubber supplies exceptional wearing quality. This fan belt is made in the Ford size only for the present. It is guaranteed by the manufacturers for one year.

The new organization is composed of a group of successful automobile accessory men, headed by Kenneth Cloud, of Chicago, who has been associated with the sale and manufacture of accessories for the last six years. He started in the accessory business in Long Beach, Cal., as a member of the Cory-Fitzgerald-Cloud Co., which put the "Myle Mayker" and the "Forty-More" generator on the market.

In connection with his work on these products, he discovered "cork insert" transmission lining, and was instrumental in

organizing the Advance Automobile Accessories Corp. which took up the sale of this lining. Not only did Mr. Cloud handle sales, advertising and merchandising for the corporation, but he created the Advance house organ, "Let's Go," which is well known throughout the trade.

Mr. Cloud resigned from the Advance company on Feb. 15 to organize the Cloud Accessories Corp. The main offices and storerooms of this company are located at 1408 S. Wabash Ave., Chicago.

### 1920 En-ar-co Year Book Encyclopedia of Useful Information.

Mr. Garagemen: Have you seen a copy of the 1920 En-ar-co year book, published by the National Refining Co.? If you have not, you have missed one of the snappiest booklets of the season. Published in the interests of those who deal in En-ar-co products, it cannot but prove an inspiration in that it contains innumerable plans and ideas for pushing sales.

For nearly half a century the National Refining Co. has been making dependable petroleum products. Long before the advent of the automobile, White Rose gasoline was a big power with the trade, and National Light oil was the electricity of thousands of homes. In big demand to speed up the slower traffic of that period was Black Beauty axle grease.

Today, as in those days, these brands are

year book, which also contains lubrication charts, automobile statistics and other information of intrinsic value.

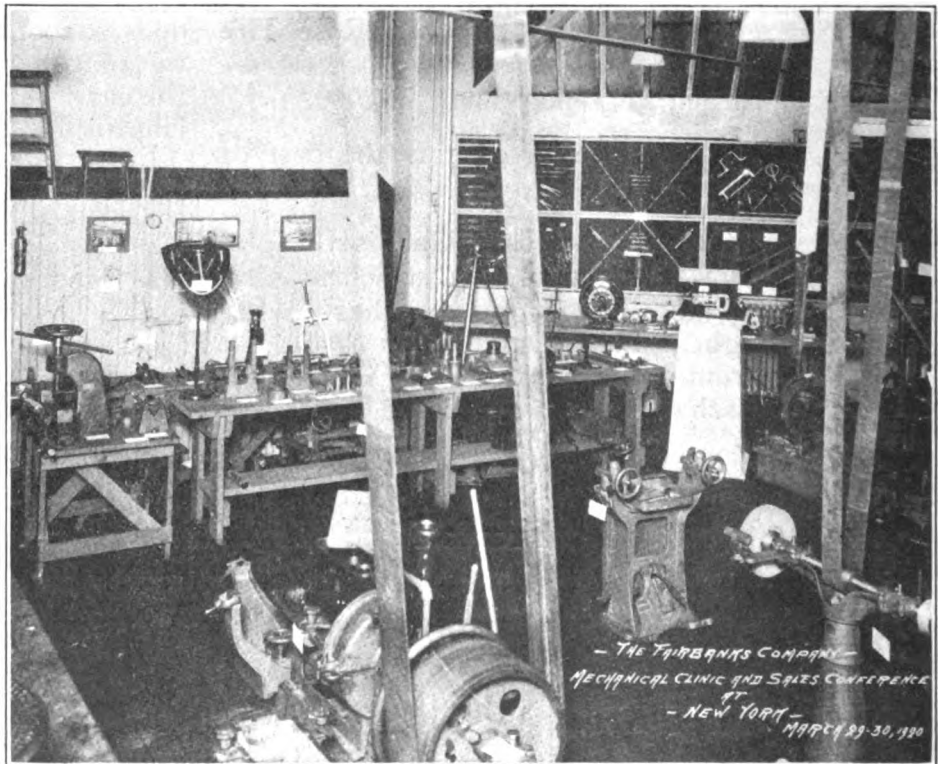
The National Refining Co. has worked out a system of co-operation with dealers that is both unusual and interesting. Where a dealer purchases 50 gallons of En-ar-co motor oil, 25 of the dealer's customers are entitled to the fascinating En-ar-co auto game. Cuts and copy are supplied free of charge by the company for use by dealers in their local advertising. These offers are described in the year book, we've been telling you about.

In short, the year book is an encyclopedia for all those who want up-to-the-minute ideas for making sales.

Write at once for copies to the National Refining Co., Cleveland, Ohio, and mention the American Garage & Auto Dealer when writing.

### Fairbanks Co. Demonstrates Burning-in and Running-in Device.

One of the features of a clinic recently held by the automobile and service station equipment division of the Fairbanks Co. was the demonstration of the Ford and Fordson Special which has been specially designed by the company for burning-in and running-in Model T Ford and Fordson bearings. The old method of scraping bearings by hand usually required from five to 12 hours' time and produced about 45 to



The Automobile and Service Station Equipment Division of the Fairbanks Co. Held Their Sessions Where Practical Demonstrations Could Be Given.

both dependable and popular. The growth of the organization is shown by the fact that five modern refineries and 89 branch offices have been established. These great refineries are illustrated in the company's

50 per cent bearing surface. With the Ford and Fordson Special it is said that a bearing surface of 100 per cent can be obtained in from 20 to 30 minutes.

All main and connecting-rod bearings

## The patch on that tube is something you can sell to every motorist

**I**N fact, the complete line of Goodrich Tire Accessories, as well as patches, should be in every motorist's repair kit.

A mere suggestion sells Goodrich Tire Accessories. As a matter of fact, they actually sell themselves, if displayed properly — and best of all, they'll sell the whole year 'round.

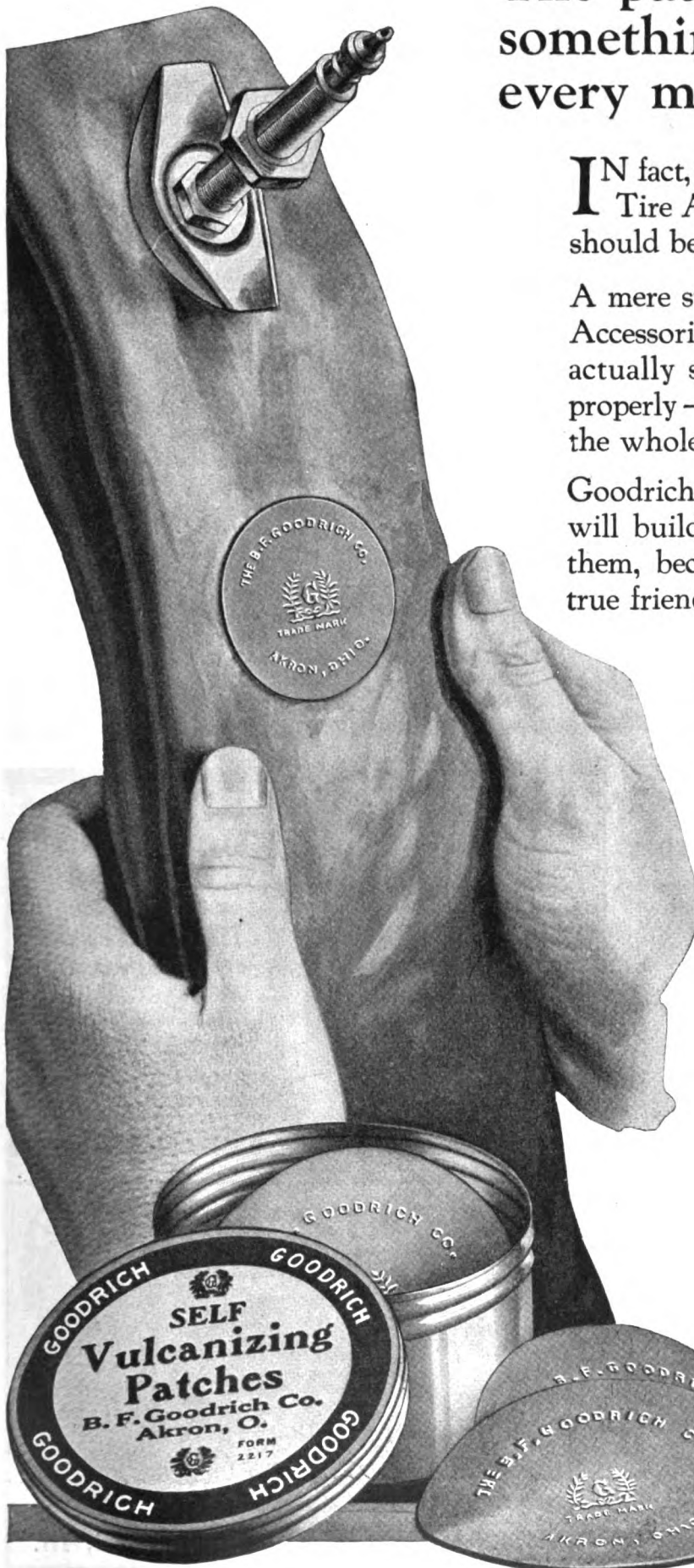
Goodrich Tire Accessories are goodwill builders for the dealer who sells them, because they are *dependable* — true friends in an emergency.

Stock up with a supply to-day and watch how quickly they'll move off your shelves.

**THE B. F. GOODRICH  
RUBBER COMPANY**

*Akron, Ohio*

**Goodrich  
Tire Accessories**



were burned-in in full view of the spectators. After the bearings had been burned-in, the motor block was turned and the bearings, connecting-rods and pistons were run in and limbered up with oil.

Although this was the first clinic ever held by this branch of the Fairbanks Co., its success seems to indicate that it will take its place as a regular feature in the New York sales promotion campaign of this division.

### M. W. Dunton Co. Adds Display Screens to Selling Plan.

An attractive window display screen for use by dealers who sell Nokorode soldering paste and soldering kits has been added to the selling plan of the M. W. Dunton Co.

In addition to the window display, which is just another link in the chain that is being built between the store of the dealer and good business, are instructive booklets that enable everyone to learn how to do practical soldering. Material for window trims including display cards, interesting and instructive booklets and circulars, accompany each case of Nokorode paste and each case of Nokorode solderkits. The literature is for distribution to customers.

The purpose of this co-operation of the company with dealers who handle Nokorode products is to spread the art of soldering. Because the Nokorode solderkit

is a practical working outfit—because the instructions which accompany it are so simple and complete—every solderkit makes a friend for the dealer.

Most hardware merchants, the company claims, turn over their Nokorode stock 12 times a year—by letting the Nokorode selling plan work with them.

Dealers! Drop a line to the M. W. Dunton Co., Providence, R. I., and let them send descriptive literature on how to make the selling plan work for you. Mention the American Garage & Auto Dealer.

### New Era Spring and Specialty Co.'s Interesting Motor Catalog.

Modern equipment and manufacturing methods, the thorough development, coupled with a clearly defined marketing policy through accredited channels, are said to be the principal reasons for the popularity of the New Era Spring & Specialty Co.'s "Better" motor requisites.

In a complete 20-page catalog, just issued, the company gives detailed descriptions of its line which includes springs, tire carriers, and spring bumpers. The catalog contains 105 clean-cut illustrations.

Dealers and garagemen will not only find the catalog interesting, but of practical value as well. All New Era products are guaranteed by the company to be made right, priced right, and sold right.

Send for copies. The address is New

Era Spring & Specialty Co., Grand Rapids, Mich. When you write, do not fail to mention the American Garage & Auto Dealer.

### New England Mills Co. Policy of Prompt Service Brings Success.

In a recent bulletin issued by the New England Mills Co., one of the leading automobile accessory jobbers, the company states that its operating policy is "Orders In today and Out today." It must indeed be a great satisfaction to any dealer not only to have his goods shipped the day the order is received, but also to have them billed the same day the order is received, with receipts attached and all the information so that he will know just where to look for his goods and when to expect

This policy together with the fact that the company is a careful buyer and keeps its warehouse full is undoubtedly the secret of its success, for the growth of the organization has been remarkable. From a capital of \$15,000 and a stockroom of 1,100 square feet, it now has a capital of \$150,000 and an establishment with over 20,000 sq. ft. besides large warehouse space.

The monthly catalog of the New England Mills Co., "The Little Salesman," contains information as to current prices, which is of the greatest value to customers. Copies will be sent to those writing to the New England Mills Co., 1027-33 West Van Buren St., Chicago, mentioning the American Garage & Auto Dealer.



### Best for Garage Work Graham Socket Wrenches

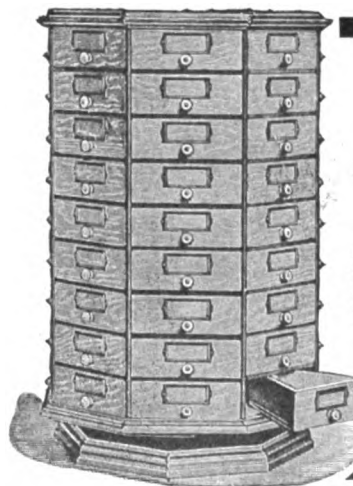
Known throughout the automotive industry for their unexcelled strength and reliability. Turned from the best solid bar stock and heat treated.

No. 3 Set, shown herewith, meets the needs of garages and large cars. Eight sockets and handle packed in neat canvas bag.

Get literature and dealer prices.

**Graham Roller Bearing Co.**  
COUDERSPORT, PA.

Price \$2.75



### Keep your supplies in revolving cabinets like these

Systematic! Conveniently Accessible! Just like "rolling off a log" to look up bolts, screws, etc., with this revolving cabinet. Everything at your finger tips, with nothing to burden your memory. Used by leading garages of this country.

Buy today from your jobber.  
Catalogue on request.

**American Bolt &  
Screw Case Co.**  
DAYTON, OHIO

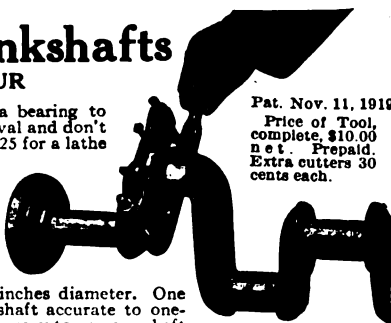
### Grind Crankshafts IN ONE HOUR

Don't attempt to scrape a bearing to crank pin that has worn oval and don't pay a machine shop \$15 or \$25 for a lathe job. Get the extra profits yourself. Send for an

#### Atlas Abrasive Tool

and do the work easily, by hand, right in your own shop without machinery of any kind. Adjustable to crank pins from 1 1/2 to 2 1/2 inches diameter. One hour completes the entire shaft accurate to one-thousandth. Not even necessary to remove shaft from crankcase. Use the same old bearings. The Atlas Tool removes just enough to true up bearing, making reabbtting unnecessary. 3000 satisfied users. Get yours now. **WIRE YOUR ORDER TODAY.**

**ATLAS MANUFACTURING COMPANY**  
702 N. Canal St. Pittsburgh, Pa.



Pat. Nov. 11, 1919  
Price of Tool, complete, \$10.00  
in c. Prepaid.  
Extra cutters 30 cents each.

### LOURIE HYDRAULIC TIRE APPLYING PRESSES

are making money for hundreds of garages and service stations. The rapid movement of the ram makes this press superior to other makes of presses.

We manufacture Hydraulic Presses, Pumps and Valves for any purpose which requires pressure. *Write for Catalogue*

**LOURIE MFG. CO., Springfield, Ill.**





**Ford Users** Don't Really Want Cheap Springs any more than cheap or poor tires or service. Cheap (?) goods—usually are the dearest—especially if the *cost of installing* must soon be repeated.

NEW ERA  
BETTER  
SPRINGS

TYPE A



NEW ERA "SAVEUR"  
Complete. . . . . \$6.50  
Saveur Open Looped Leaf only \$2.50

## 'BETTER' FORD SPRINGS THAT DO STOP THE BREAKAGE

Don't queer chances for future business from customers by selling a spring no better than the broken one. Insist on **New Era Springs** from your jobber—or order direct from us.

A genuine New Era guaranteed Ford front spring is stamped A-1 and "New Era" on bottom leaf—has seven leaves graphited for about two years' lubrication, bushed, tie clips bolted, painted and oil tempered. Weight 18 pounds.

**POPULAR PRICED FORD FRONT SPRING No. A-401** is exactly like A-1 except not graphited and clips not bolted. The only one we know of sold at competitive price that is positively oil tempered.

|                                                                 |         |
|-----------------------------------------------------------------|---------|
| A-1 Ford Front Spring, 7 leaves (Graphited) . . . . .           | \$ 4.50 |
| A-401 Front, not guaranteed, 7 leaves . . . . .                 | 3.50    |
| A-2 Rear Standard tread 51 lbs., 8 leaves (Graphited) . . . . . | 12.00   |
| A-1900 43 lbs., Rear, 8 leaves (not guaranteed) . . . . .       | 10.50   |
| A-402 Rear Tread, 60 inch, 8 leaves (Graphited) . . . . .       | 15.30   |

It's poor economy to spend labor replacing a broken spring with one NO better. Use New Era "Better" Springs for all cars, and stop the breakage. 150 best jobbers list them.



### Sold by 220 Best Jobbers

#### FORD TRUCK SPRINGS

|                                              |         |
|----------------------------------------------|---------|
| T-1210 M/T 1/2 T. R. Half R. or L. . . . .   | \$ 7.40 |
| T-1208 R. S. 52x3, 9 L. 1 Ton. . . . .       | 31.50   |
| T-1209 R. S. 50 1/2 x3, 12 L. 2 Ton. . . . . | 42.00   |
| T-1203 R. S. 49 1/2 x2 1/2, 8 L. . . . .     | 19.30   |
| T-1204 R. S. 42x2, 10 L. . . . .             | 18.65   |
| T-1205 R. Relief, Cr. 31x2, 7 L. . . . .     | 5.50    |

#### FORD TRUCK SPRINGS—Cont'd

|                                          |         |
|------------------------------------------|---------|
| Olson Unit One-Ton Truck                 |         |
| T-1207 R. S. 44x2, 7 L. . . . .          | \$14.60 |
| Redden Truck                             |         |
| T-1206 R. S. 40x2 1/2, 8 L. . . . .      | 15.75   |
| Smith Form-A Truck                       |         |
| T-1200 R. S. 42x2, 10 L. . . . .         | 13.65   |
| T-1201 R. S. 42x2, 12 L. . . . .         | 16.50   |
| T-1202 R. Relief, Cr. 31x2, 7 L. . . . . | 6.00    |

Ask for complete stock list of Better Springs for all cars.

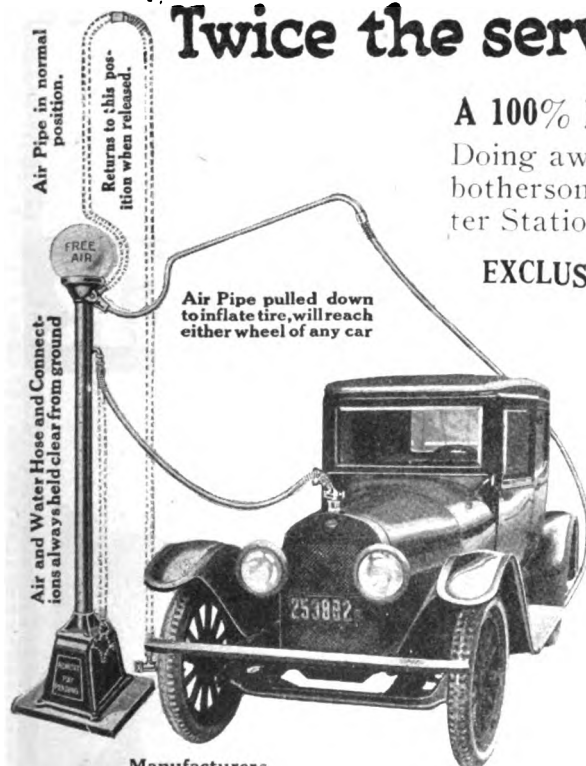
#### Extra Heavy Springs for Ford Cars of Commercial Use

|                                                              |         |
|--------------------------------------------------------------|---------|
| A-1894 Front, 9 plates, (Graphited) . . . . .                | \$ 6.50 |
| A-1895 Front, 10 plates, (Graphited) . . . . .               | 7.20    |
| A-1896 Rear, 56-inch tread, 10 plates, (Graphited) . . . . . | 19.50   |
| A-1897 Rear, 56-inch tread, 11 plates, (Graphited) . . . . . | 21.50   |
| A-1898 Rear, 60-inch tread, 10 plates, (Graphited) . . . . . | 22.00   |
| A-1899 Rear, 60-inch tread, 11 plates, (Graphited) . . . . . | 24.00   |

**NEW ERA SPRING & SPECIALTY CO.** 156 Cottage Grove Ave.  
GRAND RAPIDS, MICH.

# THE ROMORT AIR & WATER STATION

## Twice the service in half the time



### A 100% IMPROVEMENT IN AIR AND WATER SERVICE

Doing away entirely with the dirty, grimy air hose and the bothersome old water bucket, the new Romort Air and Water Station adds at least 100% to your air and water service.

### EXCLUSIVE FEATURES APPRECIATED BY ALL WHO KNOW

The air hose of the Romort never touches the ground to become dirty and grimy, nor can it become broken by cars running over it, for the hinged air pipe returns to a vertical position after using, holding the air hose clear of the ground at all times.

There can be no kinks or breaks in the hose to impair the flow of air and there are no joints to leak, as there is one continuous hose from the tire valve to the base of the stand.

### CONTINUOUS ADVERTISING

With its electrically lighted globe it is on the job 24 hours a day, by far the most effective advertising and trade builder obtainable.

**BUILT IN TWO STYLES:** No. 11. Air Station without water.  
No. 12. Air Station with water.

Manufacturers  
**THE ROMORT MFG. CO.**  
Oakfield, Wis.

Write Today for Full Details

Sales Dept.  
**THE ZINKE CO.**  
1328 Michigan Ave., Chicago, Ill.

## Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

**Over 350,000 sets now in use**

Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

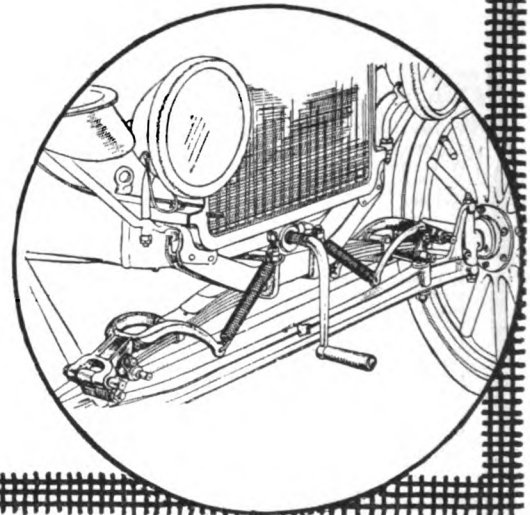


**Price \$12.00 per set of four.**

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

**P. H. Webber Company**  
HOOPESTON, ILL.

Chicago Sales Office:  
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.  
In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.  
London, Ont., Canada



## You get a good share of the profit.

The **MODEL "N" MARVEL CARBURETER** improves car performance, and increases mileage from 22 to 25 miles per gallon.

No changes are necessary to install it. Fits right in place of regular installation.

## MARVEL CARBURETER

*Designed especially for FORDS*

sold on 30 days' trial, with money back if not satisfactory.

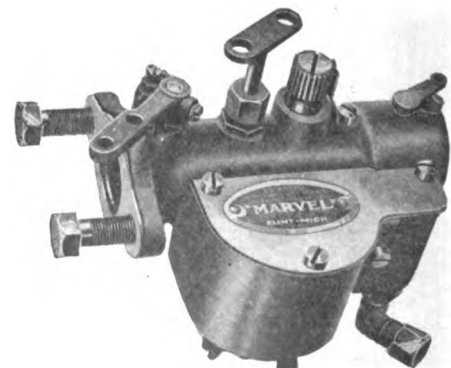
**Price F. O. B. Factory \$10.00**

**MODEL "E" CARBURETERS** are standard on Buick, Oakland, Nash, Scripps Booth, GMC, Wilson and all  $\frac{3}{4}$ -ton U. S. A. Government Trucks.

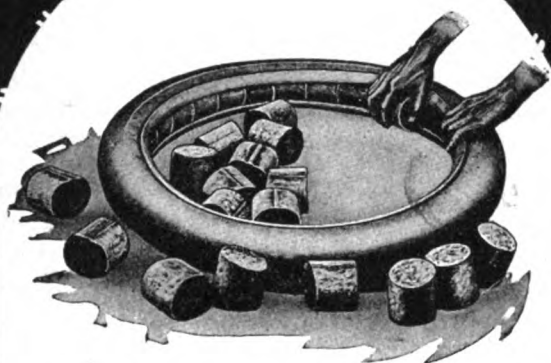
**MODEL "E" Carbureters** greatly improve Maxwell, Overland, and Studebaker cars.

**DEALERS—If interested, write for further information**

**MARVEL CARBURETER COMPANY**  
FLINT, MICHIGAN, U. S. A.



# The TIRE FILLER that has made good



## Trouble-proof tires with ample resiliency

is a combination that was long sought by the motoring public. Some tire fillers failed to stand up under long service—most of them lacked the essential resiliency. But these two vital qualities were at last combined in

# NATIONAL RUBBER TIRE FILLER

It has brought joy and satisfaction to tens of thousands of car and truck owners. It has done away with punctures, vulcanizing, patching, tire repairs of all kinds. Users get 10,000 to 20,000 miles out of every tire.

Besides, National Tire Filler has a wonderful resiliency. It takes the place of air, rides as easy, and does away with the inner tube.

National Rubber Filler is made of the best grade of rubber, cut in small particles, treated, moulded and vulcanized by our special process. The result is a compound that is light, strong and resilient. Made in sizes to fit all standard tires. It is laid in the tire and not melted or poured in. Will not harden, freeze, or melt—fully guaranteed against deterioration in any form.

DEALERS—National Rubber Tire Filler sells because it has made good. It combines comfort with economy of tire upkeep. We have a fine proposition for you. Write us today.

**National Rubber Filler Co.**  
210 College St. Midlothian, Tex.



## OPLEX SIGNS

## They "Hook Up" Your Location With The Maker's Name

EVERY day thousands of people are reading about the car you sell. They know the trademark through national advertising. Put that trademark above your door in the form of an Oplex Electric Sign and "hook up" that good will with your location.

Oplex Electric Signs have raised, snow-white glass letters standing out from a dark background. They are excellent day signs as well as night signs.

They have greatest reading distance, lowest upkeep cost. Any trademark can be perfectly reproduced in Oplex characters. The designs are artistic and in harmony with the surroundings.

Let us tell you the whole Oplex story and send you a sketch showing how your Oplex Sign will look.

## THE FLEXLUME SIGN CO.

*Electrical Advertising*

Niagara St. and Potomac Ave., Buffalo, N.Y.

Pacific Coast Distributors  
Electric Products Corp.  
Los Angeles, Cal.

Canadian Factory  
The Flexlume Sign Co., Ltd.  
Toronto, Ont.

BUFFALO

## Equip Your Garage for the **PROFITABLE** Jobs

**Y**OU are not making the profits you should out of your garage unless you are equipped to handle reboring jobs along with your general motor repair work. With Storm Motor Repair Equipment you can handle all motor rebuilding work quickly and accurately. You don't need experienced men. *Storm Tools are made by practical men for practical purposes.*

Storm money-making tools include—the Storm Standard Reboring Machine, the Valve Port Renewing Tool, the Connecting Rod Bearing Reamer, Jig and Straightening Gauge, the Special Piston Vise, and the Main Bearing Babbiting and Boring Tool.

Get ready for the big Spring business. You can make your garage headquarters for repairs in your neighborhood. Write us today.

**Storm Mfg. Co.**  
Minneapolis, Minnesota  
Dept. E

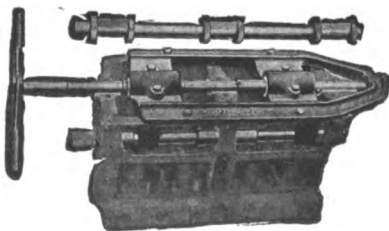


**The Storm Standard  
Reboring Machine**

Made in various capacities for hand or power operation. Head is provided with six duplex spiral cutters, with universal adjustment for reboring different sizes and to permit regrinding and resetting. There is a Storm Machine for your individual requirements.

**The Storm Main  
Bearing Babbiting  
and Boring  
Tool**

Puts in a new, perfect bearing exactly the same as the original and in the proper position. Operation is simple and can be completed in less than thirty minutes.



# STORM

**MOTOR REPAIR EQUIPMENT**

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

## TORIT OXY-ACETYLENE EQUIPMENT

TORIT LEAD BURNING OUTFIT, designed especially for battery repair work, but suitable for radiator work, soldering, brazing and light welding, such as fenders, brackets, etc. *Most convenient and profitable around the garage.*

TORIT WELDING OUTFIT, the ideal outfit for the auto repair shop. No garage is complete without a welding outfit, and no work is more profitable. *Let us tell you about the TORIT.*

KEROSENE PREHEATING TORCH—For the shop where considerable welding is done a preheating torch will save time and gas, and will help to give better welds. Quicker, cheaper, and more convenient than charcoal.

### SERVICE:

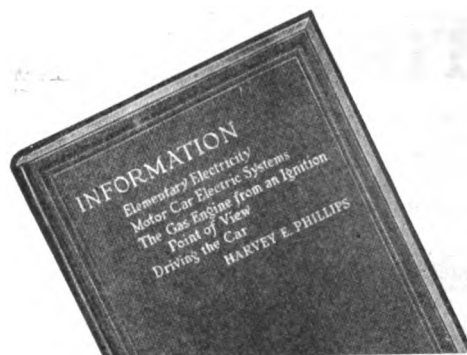
*We conduct the largest and best-equipped welding shop in the Northwest. Crank cases, cylinders, etc., handled by experts.*

We **GUARANTEE** the finest kind of **ALUMINUM** work

**St. Paul Welding & Mfg. Co.**

172 West Third St.

St. Paul, Minn.



## The Repairman's Most Dependable Guide

This 500 page book will solve many of your most perplexing problems. It gives the facts that you need to thoroughly understand, the theory of electricity and its application to the operation, care and repair of starting, lighting and ignition systems. Complete in detail and thoroughly practical. Used and recommended by all manufacturers.

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**H. E. PHILLIPS & COMPANY**

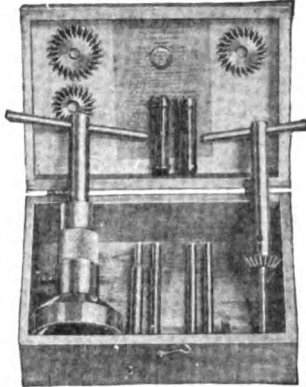
Box 56 UNION CITY, INDIANA  
Formerly Phillips Engineering Co. and Auto Electric Systems Co., Dayton, Ohio.



## A real friend of the garageman

### FOSNACHT VALVE RESEATER

The oldest valve seater on the market and still the leader. The quickest, most accurate and most dependable of them all. This compact dependable outfit will serve you long and well—and will pay for itself over and over again.



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EKERN PORTABLE GARAGE GREASE GUNS  
EKERN PORTABLE WORK BENCH  
EKERN MOTOR STAND FOR FORD MOTORS  
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Ask your jobber or write us for literature on this money-making equipment.

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**Stopped oil trouble in the worst car in Scranton---they'll do the same for you.**

**PISTON 3A RINGS**

**PRICE'S GARAGE**  
-Scranton Post-  
118-21 No. Lawrence Ave.  
Scranton, Penna.

Dec. 18, 1920

Steel Spring Piston Ring Co.,  
145 Metropolitan Ave.,  
Brooklyn, N. Y.

Gentlemen:

This is a long story but it's good.

A customer came in one day with an old Ford Taxi and told us to junk it. The car certainly looked ready for the junk pile. The cylinders leaked all so that he changed plugs several times a day. The car had next to no compression or power and you could hear the pistons clapping & clunk away. He was disgusted with it.

Your salesman came in about this time and asked us to try your rings in the worst car we had in our shop. We sent him one better; we put them in the worst car in Scranton.

The result? The customer took back the old car. He is running around the city now doing stunts with the same old Ford Taxi he wanted to junk. He says the car is better than most of the new ones. Clunks the alleys with the best of them. He has almost doubled his former mileage on gas and oil.

What do we think about 3-A Piston Rings? We stick them now. That's our answer.

Noting this will prove of some use to you in your campaign for more efficient motors, we remain,

Very truly yours,  
J. H. Price

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**STEEL SPRING PISTON RING CO.**  
145 Metropolitan Avenue,  
Brooklyn, N. Y.

WE HAVE A PROPOSITION  
FOR RESPONSIBLE AGENTS

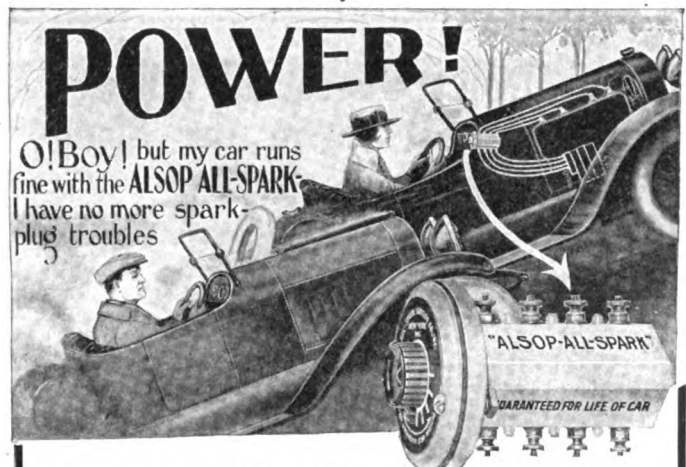
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Kindly hurry that order for Inflating Valves. We had no trouble with our Free Air Station as long as we used this Valve but when we had to put in another make,—the fun began.

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**Dealers Will Find  
Ready Profit and Quick  
Sales by Handling the**

Controlled from a handsome dial on dashboard.  
PRICE: 4-CYLINDER TYPE \$7.50  
WITH MONEY-BACK GUARANTEE.

## "ALSOP-ALL-SPARK" SIMPLE--SAFE--SURE

It eliminates the cost of new plugs by causing old, cracked, carbonized and oil-soaked plugs to give powerful sparks, which retards carbon, saves gas, develops greater power, and insures continued driving without misfires. Control is from a handsome dial on dashboard, so that a low voltage hot spark can be used for starting.

NOTE:—This device does not contain DANGEROUS EXPOSED SPARK GAPS, which may SET YOUR CAR AFIRE and make your engine HARD TO START.

Write for our great Catalogue of GOVERNMENT TESTS

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NEW YORK**

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**embody every desirable feature  
that you want in your air plant**

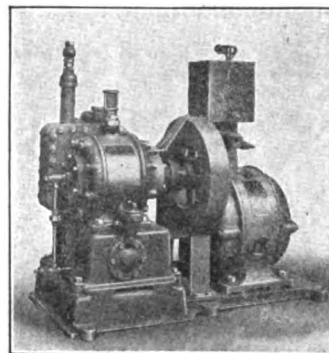
Slow Speed. No Vibration. Positive Displacement. High Overall Efficiency. Very Low Cost of Upkeep. No Expensive Foundations. Easy to Install. Perfectly balanced. Quiet in operation. Check Valves on Discharge. No Valves on Intake. Simple to operate.

Weighs less than One-Half of other types. All bearings Hyatt Roller—"High Duty." Only five moving parts always running in oil. Prices and literature on request.

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231 S. Cherokee Street

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Vanderpool Co., Springfield, O. Gentlemen—We have had excellent success with our two Vanderpool Vulcanizing Machines. We have NEVER had anything go wrong with our cures or the mechanical parts of the machines. We have earned quite a reputation in retreading and sectional repairs in Oklahoma City and attribute it largely to your machine curing them right after they have been built up properly. ERICKSON TIRE CO. C. A. Erickson.

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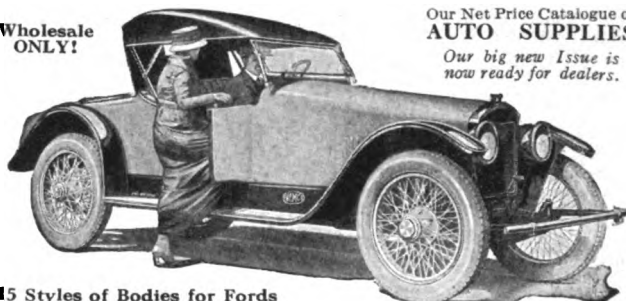
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Our Net Price Catalogue of  
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if they fail to duplicate any part of any make of automobile or truck foreign or domestic, submitted to them. That sum will be paid to the person sending the order.

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Cylinder regrounding, new piston, special casting, heat treated, Pondelick's self-adjusting, anti-leak piston rings, new wrist pin, hardened and ground, bushing made of genuine bronze, including fitting and assembling of connecting rod to piston for \$15.00.

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**Pondelick Brothers, CHICAGO ILLINOIS**

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**Charges batteries at cost of 5 to 15¢**

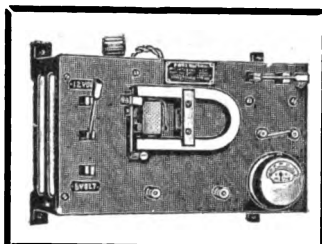
FORE RECTIFIERS are unexcelled for simplicity, efficiency and economy. They are practically automatic, easy to operate and do not injure batteries. They operate by attaching plug to lamp socket.

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**Let Your Dealer  
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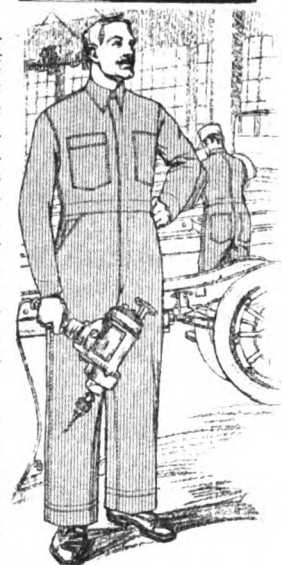
Garage and auto workers prefer Finck's Combinations for a score of good reasons. They find them the most convenient to work in. There is no binding, no straining anywhere. They fit even after many washings. They are cool—no tight waistbands—yet they fit snugly and afford perfect protection to the clothes worn under them. Many pockets, reinforced, and conveniently placed. Stay-on buttons are little details that please. And they wear longest because the material and construction are the best we can put into them.

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or write to us.*

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Detroit, Michigan

Manufacturers of High Grade Overalls, Men's and Women's Combination Work Suits

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**SEND THEM TO US**

and make them a real source of profit. No matter if they are punctured, rim cut, sand-blistered or blown out—we make them like new.

Our process gives old tires at least 5000 more miles of service. You can readily sell them at a good profit to yourself.

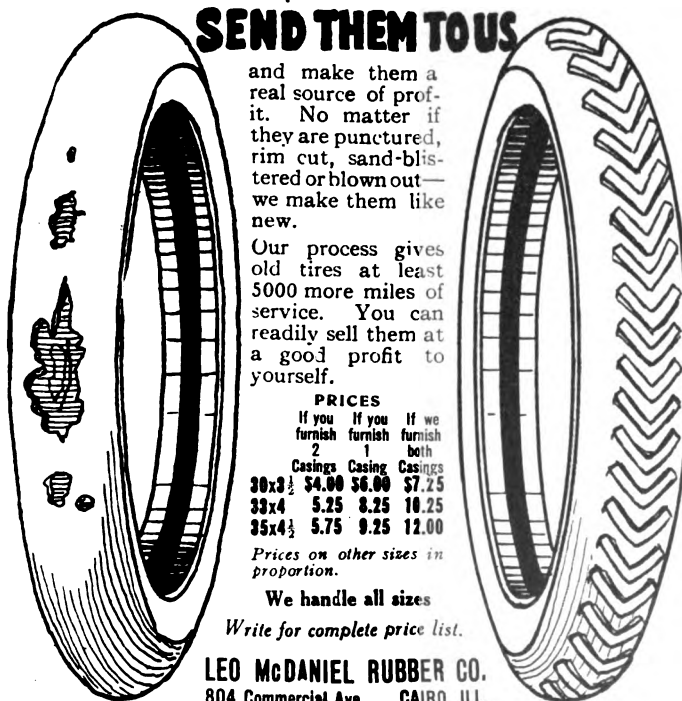
| PRICES         |                |                    |
|----------------|----------------|--------------------|
| If you furnish | If you furnish | If we furnish both |
| Casings        | Casings        | Casings            |
| 30x3 1/2       | \$4.00         | \$6.00             |
| 33x4           | 5.25           | 8.25               |
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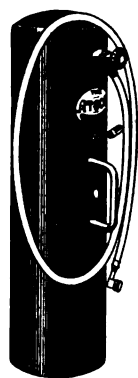
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We handle all sizes

Write for complete price list.

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The great time and back saver for filling tires. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Price, \$40.00, complete, as shown. Direct or through your jobber. Literature on request.

Pressure Tanks a Specialty for 30 Years.

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FOR FORD CARS

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*Meritorious automotive inventions financed, developed and marketed.*



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OUR LOCATION HAS ENABLED US TO BECOME

QUICK SHIPPERS

IN EQUIPMENT. REPAIR MACHINERY AND ACCESSORIES FOR THE "BIG FIVE"

Motor Car--Motor Truck--Tractor--Motor Boat--Aeroplane

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AUTOMOTIVE EQUIPMENT

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make any tire wear longer, made of only pure, live rubber — no fabric to cause friction.

*Great Proposition for Dealers*

Write at once to

**THE COFFIELD TIRE PROTECTOR CO.**  
DAYTON, OHIO

America's Aviators Used

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## High Compression PISTON RINGS

*The Standard of Efficiency*

BURD HIGH COMPRESSION RING CO., Rockford, Ill.

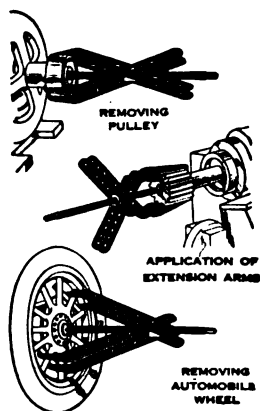
## ZELNICKER Ever-Tyte

### The Piston Ring for All Engines

More power with less gas and oil guaranteed

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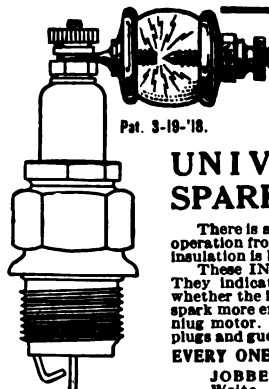
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Pulls any gear, wheel or pulley anywhere in a jiffy. Built on the only correct principle. Produces maximum efficiency with minimum effort. Can't twist off or let go. THE HARDER THE PULL—THE TIGHTER THE GRIP. Reduces operating cost and increases the earning capacity of any Repair Shop. Made from best grade drop forge steel. Almost unbreakable. Adjustable up to 13 inches diameter. Satisfaction guaranteed or money refunded. Order or write for details today. Price complete with extension arms, \$12.00.

*Liberal Discounts to Dealers.*

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## Spark Plug Troubles Are Rare Occurrences

on the car equipped with

## UNIVERSAL or MARVEL SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon.

These INTENSIFIERS will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM

JOBBERS and DEALERS—Your profit is liberal.

Write today for our attractive proposition.

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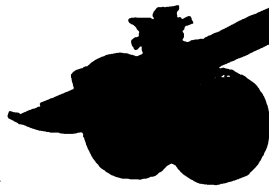


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When you get that call, be prepared to go to the rescue with a

### Holmes Wrecking Truck

You can get the crippled car to your shop quickly and easily. The time and labor saved soon pays for it. Made of the best materials with ample strength for any job.



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Sell KANTKUMOFF and make greater Profits on the Patch that can be used for both Cold Patching and Vulcanizing.

**KANTKUMOFF** has Greater Strength, Adhesion and Elasticity

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## FORD CARS MADE STRONGER

AT SMALL EXPENSE

By three absolute necessities

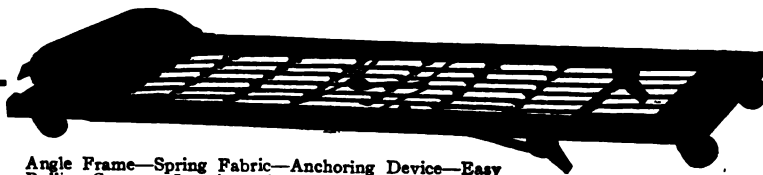
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**Auto Repair Creeper**  
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Angle Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

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Put your repair charges on a profitable basis with



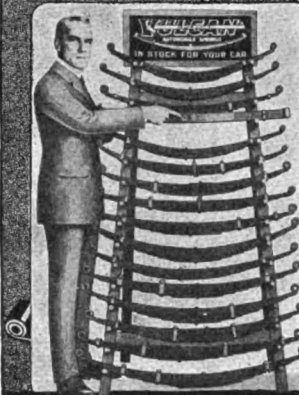
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Keep a check on your employees' time and learn exactly what each job costs. Automatic supervision turns losses into profits.

Prices moderate. Write today for booklet.

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When Springs Break, put on



## VULCAN

The Replacement Spring

Our metal nameplate is on every genuine VULCAN spring for your protection.

If your jobber cannot supply you, write us—today.

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MANUFACTURERS AND SPRING SERVICE  
**GARDEN CITY SPRING WORKS**  
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A self-heating soldering iron torch and light.

Necessary in every shop. No torch to generate. Copper points heat in one minute.

SATISFACTION GUARANTEED. SENT ON TRIAL. PRICED LOW. Write.

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give satisfaction

MAGNALITE or CAST IRON PISTONS

SPECIAL PRICES ON FORD JOBS

REGRINDING NEW PISTONS

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The automobile field offers better oppor-  
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New Oversize Pistons, Rings  
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and more miles per gallon with less  
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equipment and space insures prompt  
service and perfect work.

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### GREEN ENGINEERING COMPANY

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Manufacturers and Distributors of

PISTONS

PINS

RINGS and

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(FOR EVERY MAKE OF MOTOR)  
STANDARD OR OVERSIZE

TRY OUR SERVICE

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Standardized Prices

Material and  
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Modern Equipment

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Pistons -- Piston Rings -- Piston Pins

ALL WORK INSPECTED

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With our

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## Give the Motorist What He Wants!

Public approval is the soundest possible basis upon which to build your business. For upward of thirty years we have been pre-eminent throughout the world in the manufacture of Electrical Measuring Instruments. Today, the

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Model 354  
**AMMETER**

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for all cars.

We are the biggest wreckers in the world. The size of our business enables us to undersell all competition.

Money cheerfully refunded if you are not satisfied.

We make a specialty of our service to the trade and can supply you with practically any parts you want from stock. Orders shipped the day received. Our stock includes motors, Bosch magnets, coils, magneto parts, rear axles complete with wheels, differentials, tires, rims, and all other parts.

Correspondence from the trade invited.

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Largest Car Wreckers in the World  
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The greatest stock in the Middle West. All parts of all standard makes. Quick-cut service. Great volume makes it possible to sell to you for—

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70,000 RINGS, FORD  
.031 Oversize

16,000 RINGS, FORD  
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Offered  
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Subject to prior sale

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MARSHALLTOWN, IOWA

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We have the best equipped shop in the Northwest. Our expert mechanics and highest grade equipment are your guarantee of a superior job. Over 800 Piston Patterns in stock.

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Spur, internal, bevel, etc.

WE ALSO BUILD "CAPITOR" MARINE MOTOR

Special prices to the trade  
Write us today

**AUTO ENGINE WORKS**  
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Our Service to the Trade Is  
Unexcelled.

If you are located within 500 miles of Chicago it will pay you to send us the welding, cutting and brazing work that you cannot handle. Our work is guaranteed.

Correspondence from Garagemen Invited

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General Automobile Machine Work, Welding of All Metal—Authorized Ever Ready Battery Service Station—Sheet Metal Work—Manufacturer Catalain Hose Coupling—Sales and Service U. S. E. Shock Eliminators.  
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**NO CARBON—MORE POWER—LESS FUEL** Price 50¢ up

**"NO-LEAK-O"**

On market 5 years. Over 10,000,000 in use. Every set guaranteed. Popular thru service. Don't rebore cylinders. "NO-LEAK-O" makes good when others fail. Made different. Give results no other ring can. Write for booklet. Order from nearest Jobber, or write direct.

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Beware of infringements. Any other grooving ring will not give "NO-LEAK-O" results. See that "NO-LEAK-O" is on every package. Write for full particulars.

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**WAGNER AUTO ENGINE CLEANER**

One qt. kerosene and 6 lbs. air pressure cleans all dirt, grit and grease from engine. Prevents wear, actually saves half the usual repairs. Quick, economical, thorough, easy and cleanly to operate. Necessity for repair shops.

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Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

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 Casco Mfg. Co., Thomasville, Ga.  
 The M. W. Dunton Co., Providence, R. I. (Radiator Core.)  
 New England Mills Co., 1027 W. Van Buren St., Chicago.  
 New Era Spring and Specialty Co., Grand Rapids, Mich.

## AIR COMPRESSORS

Au-to Compressor Co., Wilmington, Ohio.  
 Brunner Mfg. Co., Utica, N. Y.  
 Champion Pneumatic Machinery Co., 1402 S. Michigan Ave., Chicago.  
 Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.  
 General Utility Co., 1333 Ogden St., Philadelphia, Pa.  
 Globe Mfg. Co., Battle Creek, Mich.  
 Jackson Compressor Co., 235 S. Cherokee St., Denver, Colo.  
 U. S. Air Compressor Co., 6542 Carnegie Ave., Cleveland, O.  
 Utility Sales Corp., 808 New Stock Exchange Bldg., Philadelphia.

## APRONS

Bailey-Drake Co., 1120 So. Michigan Ave., Chicago.

## AUXILIARY STEERING EQUIPMENT

Casco Mfg. Co., Thomasville, Ga.  
 Meixell Co., Indianapolis, Ind.

## AXLES (EMERGENCY)

H. G. Paro Co., 1410 S. Michigan Ave., Chicago.

## BALL AND ROLLER BEARINGS

Graham Roller Bearing Co., Coudersport, Pa.  
 The Norma Company of America, 1790 Broadway, New York City.

## BATTERY RECTIFIERS

Kentucky Electrical Co., Inc., Owensboro, Ky.

## BODIES

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## BODY CLEANERS AND POLISHES

Davies-Young Soap Co., Dayton, Ohio.  
 Waxit Mfg. Co., 1539 Plymouth Bldg., Minneapolis, Minn.

## BOOKS

H. E. Phillips & Co., Union City, Ind.

## BUMPERS

New Era Spring and Specialty Co., 1152 Hamilton Ave., Grand Rapids, Mich.

## CABINETS

American Bolt & Screw Case Co., Dayton, Ohio.

## CARBURETORS

Marvel Carburetor Co., Flint, Mich.

## CASH REGISTERS

National Cash Register Co., Dayton, O.

## CLEANSERS

States Chemical Co., 680 W. Austin Ave., Chicago.

## CONNECTING RODS

Au-to Compressor Co., Wilmington, Ohio.  
 Green Engineering Co., Dayton, Ohio.

## COVERS

Kennedy Car Liner & Bag Co., Shelbyville, Ind.

## CREEPERS (For Repair Shops)

Foster Bros. Mfg. Co., Utica, N. Y.

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Butler Mfg. Co., Indianapolis, Ind.  
 Green Engineering Co., Dayton, Ohio.  
 Heiser Special Tool Co., 2001-21 Washington St., Kansas City, Mo.  
 Marvel Machinery Co., Minneapolis, Minn.  
 St. Paul Auto Cylinder Grinding Co., 1152 Rice St., St. Paul, Minn.  
 Storm Mfg. Co., Thompson, Iowa.

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Am-pé-co Sales Co., Marshalltown, Iowa.

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W. L. Clark Co., Inc., 115-117 Nassau St., New York City.

## DUMP BODIES (AUTOMATIC)

Jennings Automatic Dump Body, Inc., Roanoke, Va.

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 Fairbanks Co., New York City.  
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 General Utility Co., 1333 Ogden St., Philadelphia, Pa.  
 B. E. Hicken Sod-Tor-Lite Co., Box 490, Prairie Hill, Mo.  
 H. G. Paro Co., 1410 So. Michigan Ave., Chicago.  
 Marvel Machinery Co., Minneapolis, Minn.  
 Romort Mfg. Co., Oakfield, Wis.  
 St. Paul Welding & Mfg. Co., 172 West Third St., St. Paul, Minn.  
 Storm Mfg. Co., Thompson, Iowa.  
 Zinke Co., The, 1333 So. Michigan Ave., Chicago.

## GASOLINE PUMPS AND TANKS

General Utility Co., 1333 Ogden St., Philadelphia.  
 Milwaukee Tank Works, Milwaukee, Wis.

## GASOLINE PURIFIER

Universal Gasoline Purifier Co., 258 Main St., Buffalo, N. Y.

## GEARS

William Ganschow Co., 1002 W. Washington St., Chicago.

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 H. G. Paro Co., 1410 So. Michigan Ave., Chicago.

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C. A. Shaler Co., 372 Fourth St., Waupun, Wisconsin.

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## OIL DRAIN COCKS

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Burd High Compression Ring Co., Rockford, Ill.

Butler Mfg. Co., Indianapolis, Ind.

Ever-Tight Piston Ring Co., 1609 Kingsland Ave., St. Louis.

General Utility Co., 1333 Ogden St., Philadelphia.

No Leak-O Piston Ring Co., Baltimore, Md.

Pondelick Bros., Leavitt St. and Jackson Blvd., Chicago.

Steel Spring Piston Ring Co., 145 Metropolitan Ave., Brooklyn, N. Y.

Utility Sales Corp., 808 New Stock Exchange Bldg., Philadelphia.

## PUMPS

Air-Tight Steel Tank Co., Pittsburgh, Pa.  
 Frank Rose Mfg. Co., Hastings, Neb.  
 Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

## SCHOOLS OF MOTORING

Greer College of Motoring, 1519 So. Wabash Ave., Chicago.

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Phillip H. Webber & Co., Heapeston, Ill. (W & O.)

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Federal Electric Co., Lake & Desplaines Sts., Chicago.  
 Flexlume Sign Co., Niagara St., Buffalo, N. Y.

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Chicago Solder Co., 218 No. Union Ave., Chicago, Ill.

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 All Spark Ignition Co., 13 Water St., New York.

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 Harvey Spring & Forging Co., Racine, Wis.  
 Jenkins Vulcan Spring Co., 1403 Chestnut St., St. Louis.  
 New Era Spring and Specialty Co., Grand Rapids, Mich.

## STEERING WHEELS

Au-to Compressor Co., Wilmington, Ohio.

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 F. M. Duncan Co., 114-116 E. Ohio St., Chicago.  
 Stearns Rubber Products Co., 356 W. Madison St., Chicago.  
 Zinke Co., 1333 So. Michigan Ave., Chicago.

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 Miller Rubber Co., Akron, O.

## TIRE TOOLS

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Romort Mfg. Co., Oakfield, Wis.  
 A. Schrader's Son, Inc., 753-795 Atlantic Ave., Brooklyn, N. Y. (Automatic Inflating Valve).

## VULCANIZERS

C. A. Shaler Co., 353 Fourth St., Waupun, Wis.  
 Vanderpool Vulcanizing Co., Springfield, Ohio.

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 St. Paul Welding & Mfg. Co., 172 W. Third St., St. Paul, Minn.

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Robt. Holmes & Bro., Danville, Ill.

## WRENCHES

Au-to Compressor Co., Wilmington, Ohio.  
 The Graham Roller Bearing Co., Coudersport, Pa.



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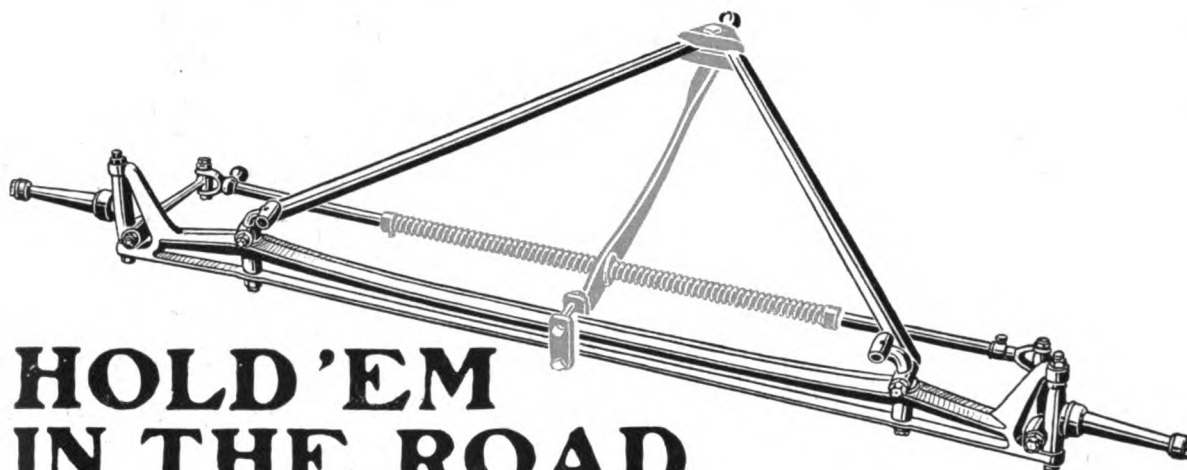
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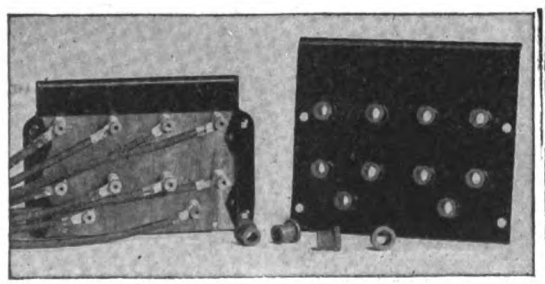


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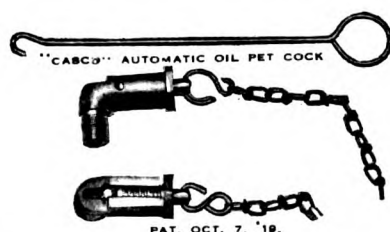
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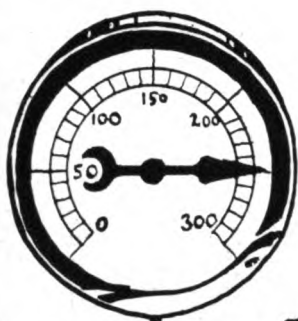
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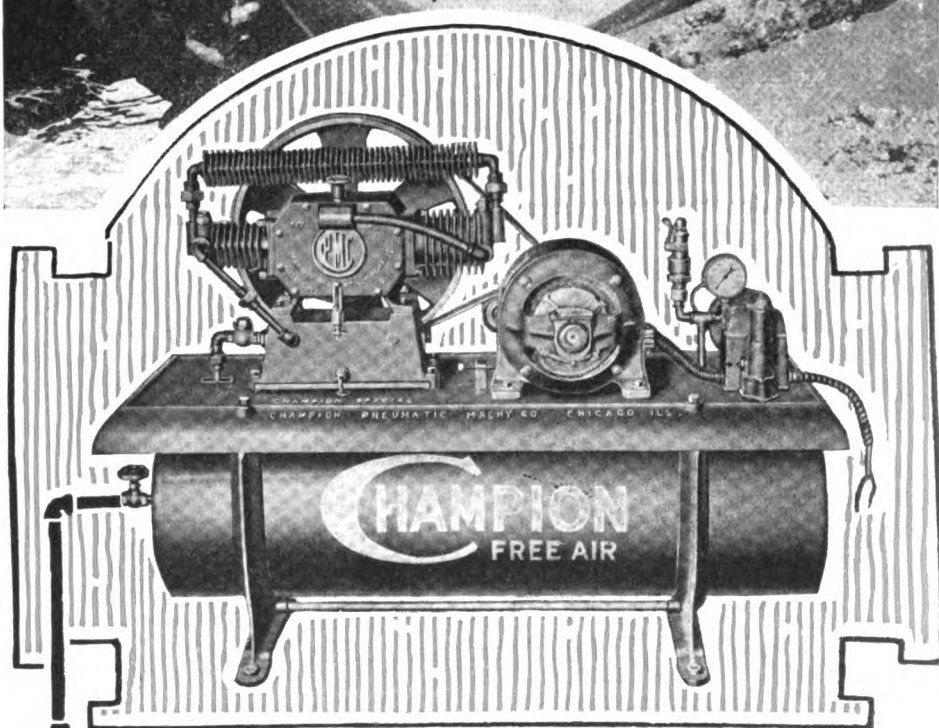
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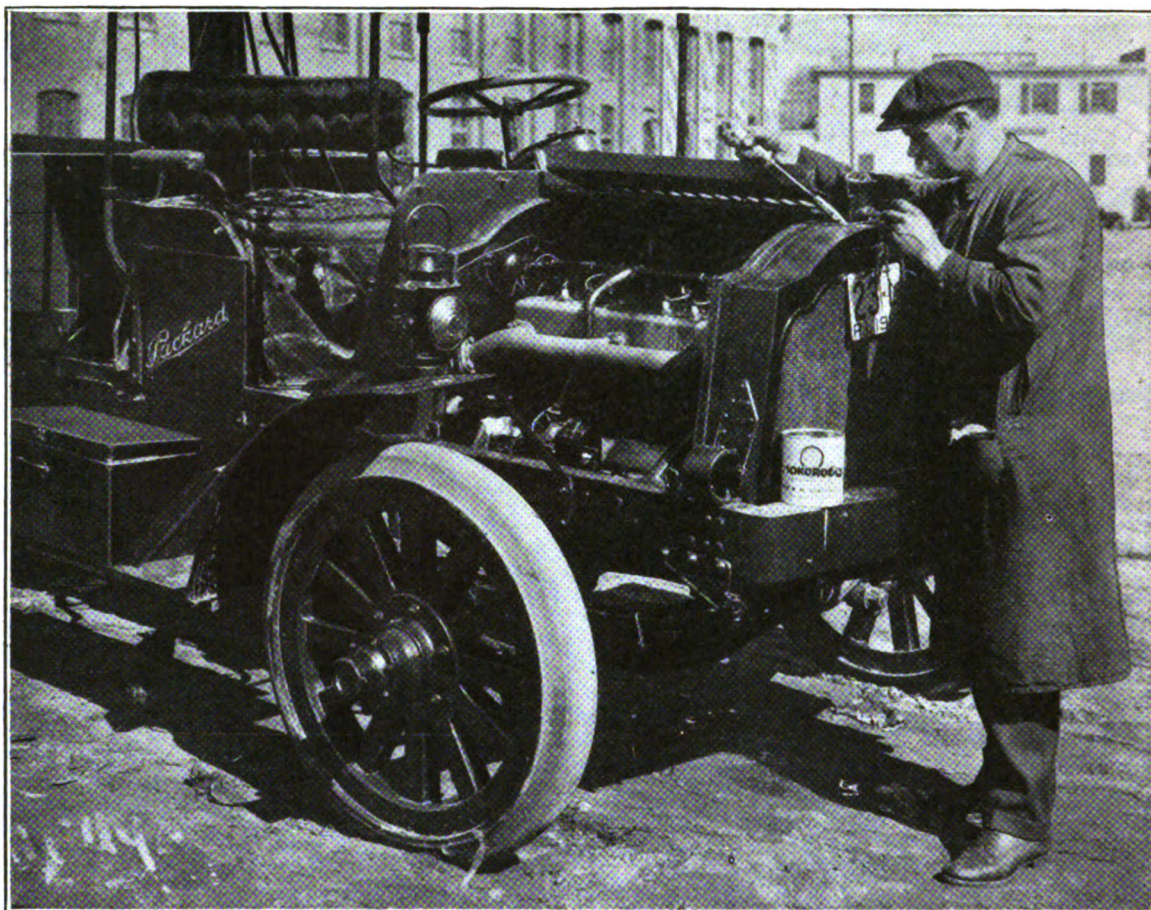


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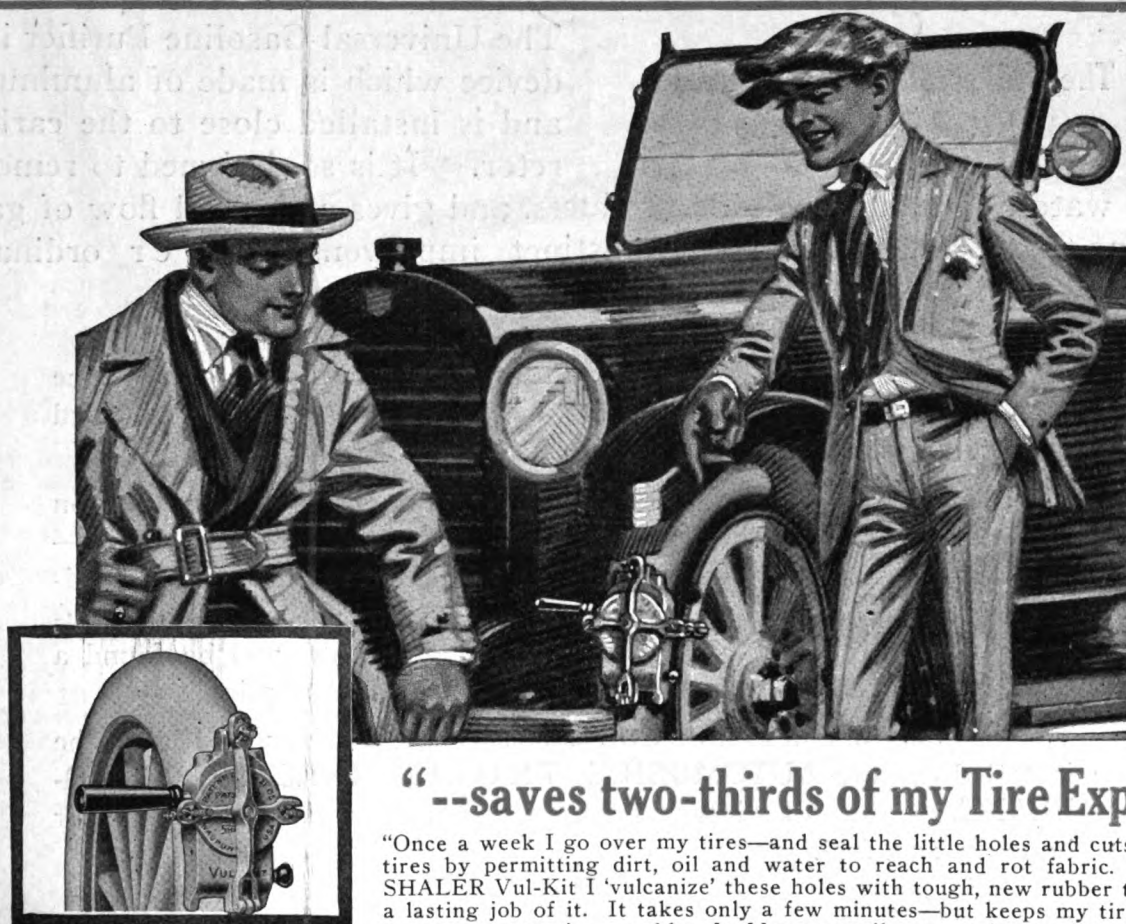


# American Garage & Auto Dealer

Published Monthly  
116 So. Michigan Ave.  
CHICAGO, ILL.

JUNE 1920

Vol. 11—No. 6.  
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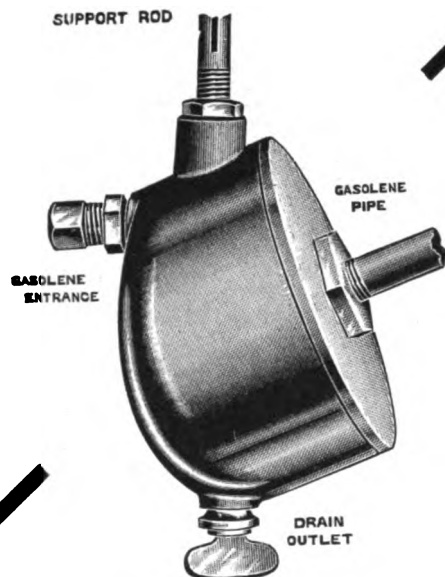
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A.C. Estep.

Los Angeles, Calif.,  
June 23rd, 1919.

Gentlemen:-

After using the Marvel a short time I soon found that I can bore and finish a Ford Block, in 56 minutes being taken from the time the block leaves the floor until it is back again.

Yours truly,  
Harold E. Hess.

## Accuracy--Speed--Capacity

These are statements, not claims—proof of actual performances—not hopes—results from daily use of a MARVEL from men who have put their hard earned money into a MARVEL and the MARVEL HAS made good.

We can furnish you enough Marvelous experiences on a MARVEL to make a big book. Every owner says the same thing. All we ask of you or any other Automotive Repairman anxious to get ahead is this—put a MARVEL in any vacant corner or other space in your shop—use our business building service and you will build up a big and a profitable business—nothing can stop you except death or an earthquake.

Do not take our word for it—read the above letters over again—consider the MARVEL from your own viewpoint—think of it for your pocketbook's sake—consider it from every angle and you will be convinced—just as over a thousand others are—that the

## Marvel Cylinder Re-boring Machine Is Supreme

There is no other machine like it—none other can take its place. It handles any gas engine cylinder from a motor cycle to a tractor. It is accurate—speedy—reliable and has capacity.

The field for re-boring is unlimited—it's in big cities and in small towns—it is anywhere and everywhere—it is merely a matter of going after it and handling it properly.

Put a MARVEL in your shop—use our business building service—it immediately identifies your shop. We will work with you to get the business in—the MARVEL will work for you to get it out and treatment on a MARVEL is simply MARVELOUS.

Cherokee, Iowa, Jan. 5, 1920.

Gentlemen:-

This block is 24 inches deep and 8 inches in diameter being 8 inches deeper than the machine is supposed to bore. The other block is also 24 inches. These blocks were bored by extending the cutting bar 8 inches. The Marvel has given excellent satisfaction.

Very truly yours,  
W. F. Hutton, Jr.

Don't Delay—Write Today

# MARVEL MACHINERY COMPANY

510 Loan & Trust Building

Minneapolis, Minn.



# "NORMA" PRECISION BALL BEARINGS (PATENTED)

Satisfactory service is the one criterion of success, in a machine or in a part of a machine. One failure will wipe out a record that has been months in the making. Year after year, "NORMA" equipped magnetos and lighting generators hold their unchallenged leadership—solely by virtue of their consistently superior service maintained under the most exacting conditions known in the automotive world.

See that your electrical apparatus is "NORMA" equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# American Garage & Auto Dealer

*Published Monthly*

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**SPINDLE CONNECTING ROD (OR TIE ROD) BENT FROM THE STRAIN OF SHOCKS AND JOLTS WHICH WEAKENS THE ENTIRE FRONT SYSTEM AND THROWS THE FRONT WHEELS OUT OF ALIGNMENT**

**STEERING CONNECTING ROD BUCKLED FROM STRAIN OF SHOCKS AND JOLTS AND THE DANGER OF GOING OVER CENTER TRAVEL WHICH MEANS THE LOSS OF CONTROL IN —**

**A Ford Controlling Itself**

**SPINDLE CONNECTING ROD (OR TIE ROD) RELIEVED OF THE STRAIN FROM SHOCKS AND JOLTS WITH THE OVER-LAND GUIDE**

**STEERING CONNECTING ROD BUCKLING SILENTLY RELIEVED AND THE DANGER OF GOING OVER CENTER TRAVEL PREVENTED BY**

**The Over-land-Guide**  
PATENTED  
**Controlling the Ford**

## One of the many repair jobs eliminated by the OVER-LAND GUIDE will more than pay for it.

Ford upkeep is greatly augmented by the undue strain to which certain parts are constantly subjected. Eventually these parts become bent, broken or worn out, necessitating repairs or replacements.

The OVER-LAND GUIDE eliminates these repairs, at a great saving to the Ford owner. It bolts to the center of the front axle and the center of the spindle connecting rod (or tie rod) securely, relieving the vibration and strain in the spindle connecting rod (or tie rod) and entire front system, and the steering mechanism up to the steering wheel.

The OVER-LAND GUIDE reduces breakage and repairs of all the following parts—such as spindle connecting rod (or tie rod); spindle body arms and bushings; spindle body and bushings; ball and roller bearings and hub; steering connecting rod and ball joints; steering gear drive pinion and steering gear pinions; steering gear internal gear case and bushings; also prevents the axle from bending—and may save your entire car from destruction with loss of lives of occupants.

As the price of the OVER-LAND GUIDE is \$8.50 and some of the repairs that it saves cost much more than that amount (to say nothing of time lost), it is indeed a profitable investment for every Ford owner.

The OVER-LAND GUIDE effects additional savings by stopping the wobbling and scooting of the front wheels—thus saving at least \$30.00 a year on tires alone.

Moreover the OVER-LAND GUIDE is life insurance to Ford owners and Fords. It gives the driver complete control over the car under all conditions. The steering gear may get out of service or the steering connecting rod may go over center travel, but the OVER-LAND GUIDE with its grip on the rod and axle will hold the car in the middle of the road until it is brought to a safe stop. It also relieves the driver of the customary physical and mental strain with which every one who has ever driven a Ford is familiar.

**DEALER AND JOBBERS:** The OVER-LAND GUIDE, backed by our iron-clad guarantee, is a ready seller to every owner of a Ford car or truck. Write us at once for our liberal proposition.

## THE MEIXELL COMPANY

216 Board of Trade Bldg.

Indianapolis, Indiana

(Foreign Distributors—Automobile Sundries Co., 79 Walker St., New York, N. Y.)

This broad guarantee protects users of the Over-Land Guide. Send us retail price, \$8.50 and we will send you, parcel post, one Over-Land Guide. Use it 20 days, properly installed, and if at the end of that time it does not do all we claim for it, full purchase price will be refunded.



In ordering state the year your car was made.

Unlike all other STEERING DEVICES, the SPRING in the Over-Land Guide is packed in hard grease and completely enclosed, which keeps it free from dust and moisture and means indefinite service and no up-keep.

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

## Victorious Tires made with expert skill

**B**RUNSWICK Tires are fortified by a reputation for quality manufacture that began in 1845 and which has attached to every product bearing the Brunswick name.

In our Brunswick Tire factories all materials are the best obtainable. The workmanship is the finest that expert tire builders can produce. And both must meet the Brunswick standards of excellence.

Because of these policies and the reputation we pledge to maintain, Brunswick Tires offer a combination of qualities not found elsewhere.

Dealers will recognize that tires of this merit are the tires to sell. Car owners know that these are the kind to buy.

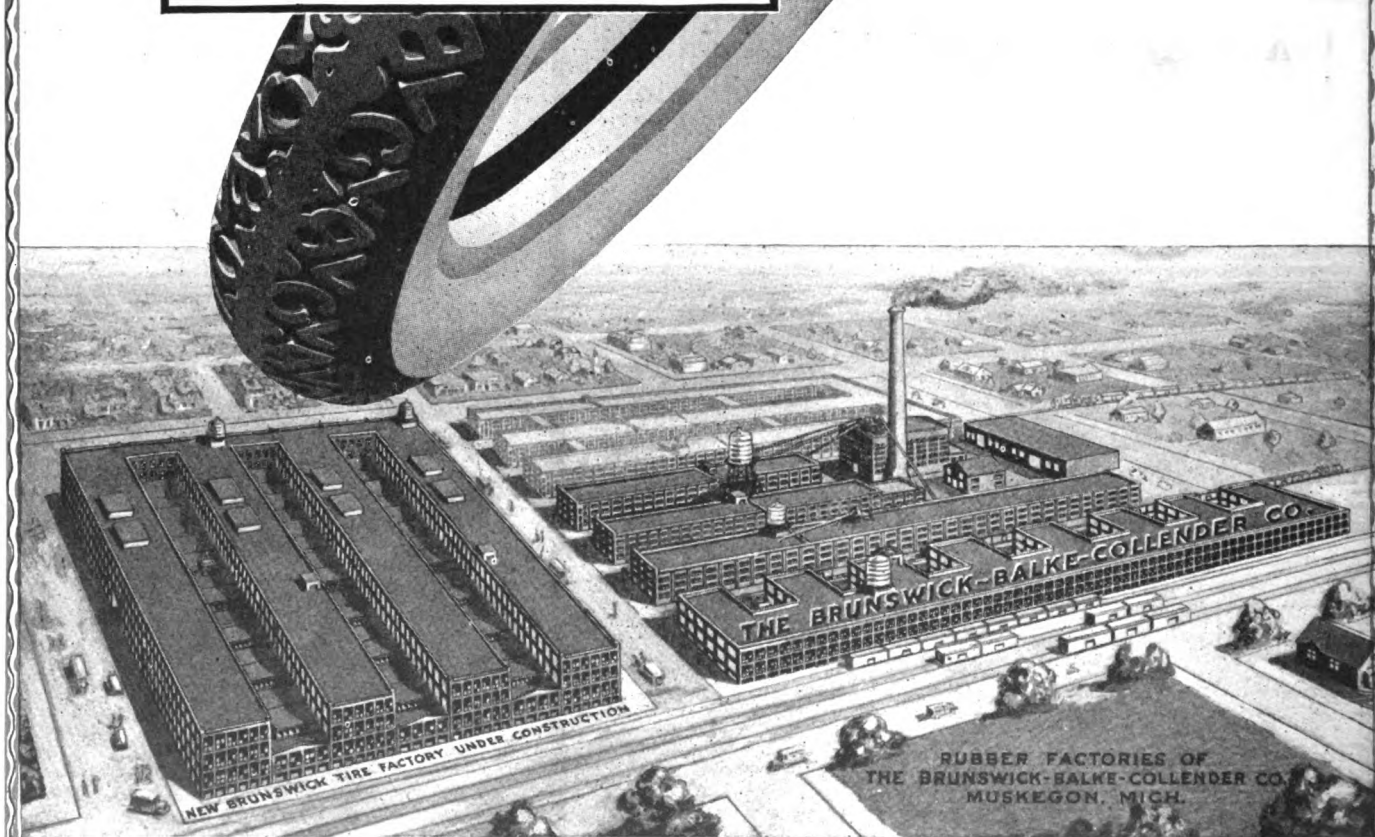
# Brunswick TIRES

*Sold on an Unlimited Mileage Guarantee*

THE BRUNSWICK-BALKE-COLLENDER COMPANY

General Offices: 623-633 S. Wabash Ave., Chicago

Branches in Principal Cities of United States and Canada



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# IGNI-TEST

## The Ideal Testing Outfit for garages and repair shops

In time saved alone Igni-Test will pay for itself in a few days. It will also enable you to make perfect repairs and adjustments—giving your customers better service and more satisfaction. With it you can locate ignition troubles at once.

Igni-Test is the invention of the Ignition Engineer who designed the Magneto Testing Device adopted by the War Department for the air service and mechanical repair shops. Igni-Test employs all the good points of the device used by the War Department and has many added improvements.

Igni-Test is a thoroughly practical outfit built for long, dependable service. It contains no delicate meters or mechanism, nothing to get out of order, does not require an electrical expert to operate it, and can be understood by everyone. With each Igni-Test we furnish charts and full instructions to make each test, and also show internal wiring diagrams of every known make of automotive spark coils and how to test the windings and the condenser. These charts alone are worth the price of Igni-Test.

**Introductory Price \$35.00, F. O. B. San Antonio**

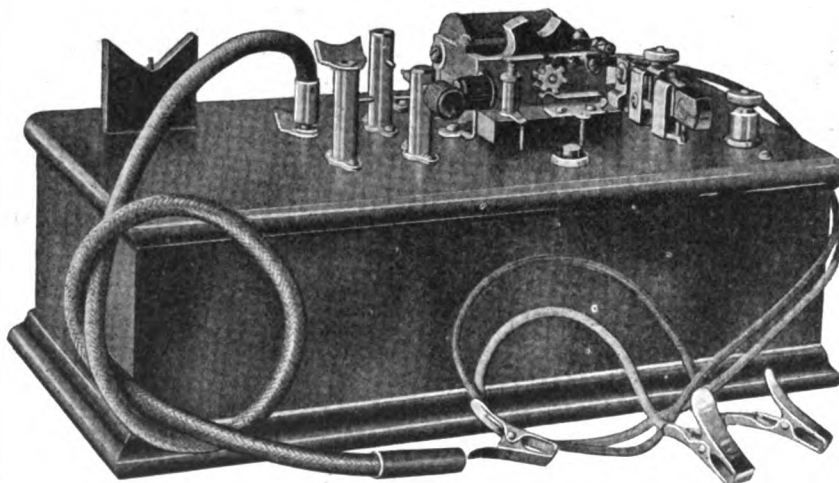
***Your money back if not satisfied.***

If your jobber can't supply you, order direct. Descriptive literature on request.

**TESTALL ELECTRIC MFG. CO.**  
San Antonio, Texas

### A few of the tests that you can make with IGNI-TEST

High Tension Magnetos on car.  
High Tension Magneto Armatures.  
Two-Spark Magneto Armatures.  
Inductor Magnetos.  
High Tension Spark Coils with self-contained Condenser.  
High Tension Spark Coils without Condenser.  
Low Tension Magnetos.  
Low Tension Spark Coils.  
Condensers.  
Condenser Break-down.  
Insulation.  
Spark Plugs.  
Fuses.  
Collector Rings.  
Distributor Plates.  
Brush Holders.  
Grounds or Opens in Line.  
Grounds or Opens in Fields.  
Ford Coils.





# TIRE-DOH is always the successful "nominee"

For popularity and usefulness TIRE-DOH receives the nomination of both dealers and car owners!

Dealers like TIRE-DOH because it regularly makes money. Car owners like TIRE-DOH because tire and tube troubles vanish when it is used.

Dominant national advertising has made TIRE-DOH the popular choice of nearly 2 million motorists.

TIRE-DOH sales are greatly in excess of any previous year. More new TIRE-DOH dealers have requested this agency since January of this year than in any previous year.

**As a practical means of repairing punctures and blow-outs, TIRE-DOH is unequalled.** Simply roughen tube with roughener, apply cement and TIRE-DOH, dust on tire talc, insert tube in casing, inflate for immediate use.

Our new process of sealing PREVENTS deterioration. When you sell a customer TIRE-DOH in a can bearing our "Nu-Seal" you can guarantee that it will be always fresh and usable, provided lids are replaced tightly.

**TIRE-DOH selling helps magnetize business.**

If you are interested in this agency write immediately.

## Atlas Auto Supply Co.

680 West Austin Avenue

CHICAGO



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers



# American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,  
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XI. No. 6

CHICAGO

June, 1920

## Building for the Future.

At the present time there are about eight million automobiles and trucks in operation in this country. This represents quite a snug business in repairs, maintenance and supplies.

That it is considerably larger than is ordinarily imagined, is readily appreciated when it is considered that this year the value of tires produced will alone amount to something like one billion dollars. Last year the production of automobiles and trucks amounted to 1.8 billion dollars. These figures indicate roughly the extent of the accessory, replacement and supply business.

It is estimated that there are about \$300 spent each season, on the average, for supplies, replacements, repairs, and accessories for each car. A little figuring will indicate that the accessory and repair end of the automotive industry is really a very substantial portion of the industry.

We hear a great deal of the "saturation point" but no one person seems to want to prophesy when it will be reached. The fact is that when statistics are consulted and analyzed, there does not seem to be any saturation point to be reached—at least for many, many years.

The production of cars this year, it is estimated, will reach about 2¼ million, and there is a consumer demand for about two million cars at the present time. The life of a car is estimated at about five years so that it is readily seen that a goodly portion of the yearly production is nat-

urally devoted to replacing cars whose useful life has ended.

We could go on giving facts as to population and future car requirements in this country and then turn to the world markets for additional facts to indicate how the manufacturers will be busy for years to come to supply the normal demands, but enough has been said to indicate the great stability of the industry.

Many people predict and expect some kind of a business depression. Already there are evidences of a "tight" money market, which is caused by the efforts of the banks to reduce the amount of credit which is outstanding as a result of our great expansion in the past two years. And there has also been some expression of thought looking to placing restrictions upon the automotive industry, it being said by some to be a non-essential industry.

The real facts, however, do not indicate anything non-essential about the industry itself. Undoubtedly, there is a great deal of waste on the part of car owners caused by the non-essential use of gasoline and oil in the operation of their cars.

Cars and trucks, however, will have to be operated regardless of business conditions. Naturally repairs and replacements will have to be made and supplies purchased for their operation. This is the business which the far-seeing automotive men will develop and strengthen. It's a case of "men may come and men may go, but I go on forever."

## Automotive Dealers and Farmers.

Recently we talked with a representative of one of the large farm implement manufacturers relative to automotive dealers and the selling of power-driven farm machinery. Said he:

"A garageman generally is a factor in remedying serious trouble with tractor motors where expert services of this kind are not available through implement dealers. This, however, we believe, is the case in only a few instances where the farmer operates quite a long ways off from the dealer who sold him the tractor.

"Once in a while it so happens that a dealer switches his agency connections from one make of tractor to another. That may cause a tractor owner to be still farther off from the repair service of the nearest tractor dealer handling his particular make of machine. Unfortunately, according to reports we have received, garagemen have done themselves, as well as tractor owners, an injustice in a few cases of this kind, by charging the farmer exorbitant prices for repair work done to the tractor.

"This kind of hold-up game causes the tractor owner to look upon garagemen as robbers. It will not create an inclination on the part of the farmer and his neighbor prospective buyers to deal with the garageman who tries to take advantage of the tractor owner who did not buy the tractor from the garage."

These are interesting points that are brought out by the implement

manufacturer. There is no reason why the garageman should not be able to render expert service in taking care of tractor repairs as well as repairs on other power equipment of the farmer.

The automotive mechanic is expert in making repairs on automobiles and trucks. As the same principles and methods, with but little variation, apply to tractors and other farm power equipment he should be capable of rendering first-class service in the ordinary repairs which farm power machinery requires. He also, in cases of emergency where immediate use of the machine is imperative, can remedy serious trouble—and the farmer is more than willing to pay a reasonable price for the work.

The matter of charges for service rendered is, of course, one of business policy. Successful men in all lines of business keep their eyes on their losses, and are familiar with costs for doing business.

Many men adhere strictly to the policy of doing a big business at a small profit rather than a small business at a large profit. Their contention, which they back up with figures, is that the net result of following such a policy is considerably better financially than "charging all that the traffic will bear" and losing patronage, when competition or circumstances permit customers to switch to other dealers.

The Rotarian principle, "He profits most who serves best," is an excellent one to follow.

---

#### **Transportation and Good Roads.**

Transportation is a subject of much concern to manufacturers and business men generally—to say nothing of the general public.

The manufacturer is greatly interested, for transportation difficulties beset him on all sides. He is short of raw materials, because the railroads cannot transport them to him. He has considerable money tied up in manufactured goods which he cannot

ship or which are delayed greatly in reaching their destination.

Lack of raw materials has caused a number of manufacturers to temporarily close their plants. This has reacted upon the business man, for his sales show a decided falling off in those places where the factories are shut down. People usually cut down on their buying when their income ceases.

The general public has been forced to pay higher prices for commodities, due to the inability of the railroads to transport them in sufficient quantities to supply the normal demand.

It is thus seen that transportation is a most important factor in our modern life, and that it affects everyone, regardless of location or occupation.

The automobile and motor truck, since the rail transportation difficulties assumed serious aspects, have been of no inconsiderable assistance in relieving the acuteness of the situation. Tons and tons of merchandise and commodities, and raw materials also, have been carried from one city to another, thus releasing for the long-haul traffic much-needed railroad equipment.

One of the necessities for efficient rail transportation is a good road bed. The railroad companies spend thousands of dollars annually upon maintenance of way. The road bed and rails undergo a continual inspection and repair. And the most successful roads are those which keep their road beds in good repair.

In the past few years many good roads have been built throughout the country. These roads have been in constant use by automobiles and trucks, and some, through lack of proper maintenance, are no longer in condition for efficient service. It is important that roads already built be frequently inspected and properly maintained. The history of the various railroads proves this.

There is agitation for the construction of national highways which will form trunk lines all over the country. The value of such a system of high-

ways is readily apparent, particularly under the existing conditions of railway transportation and the increasing use of the motor truck and automobile for relieving the rail congestion.

Of course, costs for road-building are high—but they will not always be high. Construction of short connecting links should not, however, be delayed. Plans for other roads should be pushed, so that when prices are deemed reasonable there will be no time lost in getting work started. Meantime roads already built should be properly repaired, for "a stitch in time saves nine."

Everyone engaged in the automotive business is interested in good roads and can create sentiment which will have an influence in keeping roads in good repair and building new ones.

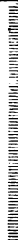
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#### **Motor Fuels and Substitutes.**

The increasing number of automobiles, trucks, and tractors has directed attention to the matter of gasoline, its production, and the sources from which the motor fuels for the future may be obtained. On other pages of this issue, appears the concluding installment of a most interesting article on the subject of motor fuels, their production, and the sources of future supply.

Dr. Dean of the United States Bureau of Mines, in his discussion of gasoline substitutes, concludes that when striking claims are made for the superiority of any substitute, they should not be taken too seriously. The substitute fuel should be given a thorough trial, but it should not be expected to find it notably superior to gasoline if indeed it is as good.

In his opinion, the oil shale as a source of motor fuel is important in that it gives a comfortable sense of assurance that the use of motor vehicles will not have to be discontinued when the petroleum resources of the country are exhausted. The entire article, a part of which appeared in the May issue, is well worth careful reading and study by everyone in the automotive industry.



By C. H. Thomas

take care of the great number of tourists who daily pass by on their way to Washington.

## MOHICAN GARAGE

**SOLD TO.....**

**Sale No.**..... **Clerk**.....

with brick, artistically arranged, is different from the usual garage entrance. This difference to most will appear as a decided improvement, to the rest all that can be said is that it has to be seen to be appreciated. In building this entrance, the door was made 12 feet, 4 inches high in order to allow the largest trucks to enter. This is often overlooked by garage owners. With motor trucks daily increasing in number, it is an item which should be seriously considered.

Immediately to the left at the entrance is the office, accessory and supply store. One of the illustrations gives a fair idea of the type of showcases and filing cases used in this room. Besides carrying a large stock of accessories, it also serves as a stockroom for bolts, nuts, and repair parts. It is also fitted up with a reading table which is supplied with the latest magazines to help the motorist while away his time if he has to wait for repairs. From every standpoint, this office and display room is equipped in an up-to-date manner.

The space allotted to storage will hold about 50 cars. It is well lighted by means of skylights and side windows. To further brighten it and give it an appearance of cheerfulness, the walls are white-washed.

In the rear of the garage is an up-

Digitized by Google

This requisition is presented to the

Fig. 3—Repair Order Form Made Out When Car Comes in for Repairs. Fig. 4—On the Back of the Repairman's Copy Is a Job Time Card.



## REQUISITION

**MOHICAN GARAGE, KENNETT SQUARE, PA.**

## PARTS and MATERIAL

[illegible]

**Workman No.** ..... **Date** ..... **Job No.** .....

**Fig. 5—Materials and Repair Parts Used Are Recorded on Regulations.**

man in charge of the stock in the main office.

From the manila shop order and the parts and material requisitions, a

plan all drivers are to do a 25-mile stage and then drive back again. The motor truck may do 200 miles or more, but no one driver more than 25.



**There Is Plenty of Parking Space in the Mohican Garage.**

record is made on the office copy and from this the invoice is made.

Besides doing general automobile repair work this garage is also engaged in battery service for all cars and all batteries. It provides the car owner with a card, as shown in Fig. 6, for keeping a record of the condition of the battery.

Robert Scarlett, the owner of the Mohican garage, believes in making things better for the motoring public. He is a man of considerable experience in automobile work and is constantly adding new ideas to better his accommodations to the car owner.

## England and Wales Plan Truck Transportation System.

A "25-mile hop" motor truck transportation scheme is being promoted for England and Wales. Under the

England and Wales will be split up into 60 equi-distant freight points, each one approximately 1,000 square miles. This will take in all of England and Wales, whose combined area

## “Exide”

## Battery Service

## ALL CARS—ALL BATTERIES

**Know the condition of your battery all the time**

Visit our "Exide" Service Station regularly. Keep an accurate record of all tests

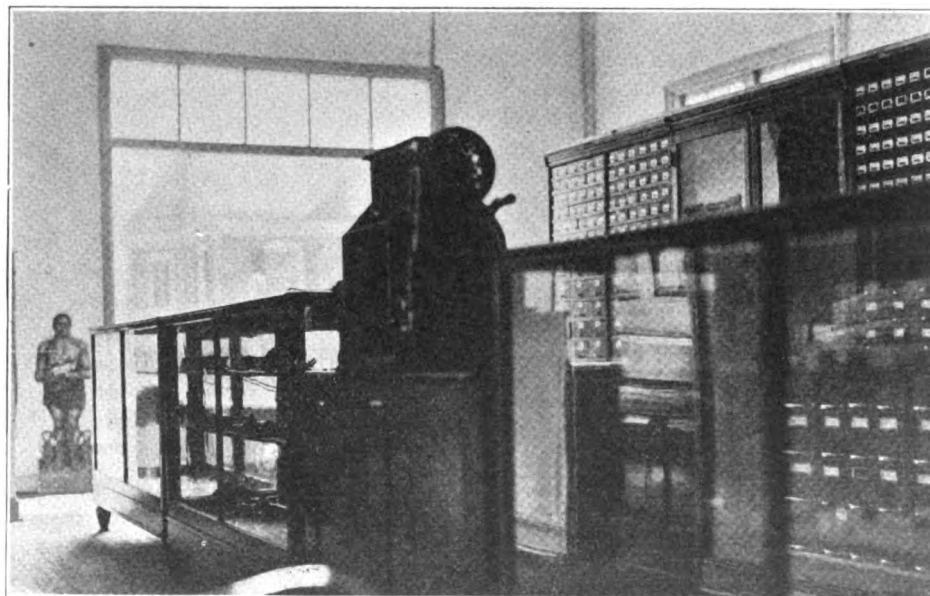
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NAME \_\_\_\_\_  
CAR \_\_\_\_\_  
BATTERY \_\_\_\_\_

**Fig. 6—Battery Record Card Supplied Car Owners.**

is slightly in excess of 58,000 square miles.

In the center of each 1,000-square mile area is to be a garage with a freight dump in charge of a clerk responsible for the collection and delivery of all freight relative to his area, depending on the destination.



**Mohican Garage Office and Salesroom Supplied With All Modern Equipment.**

# Diseases Peculiar to Occupations

Sanderson Has an Experience with an Industrial Disease—After Death of Victim, He Applied for Compensation for Widow and Learned from Authorities This Was Not Payable Unless Disease Was the Result of an Accident

By Chesla C. Sherlock

There are a number of diseases peculiarly incident to certain employments. These diseases are more or less certain to attack the worker, if he persists in the employment with sufficient regularity. It seems that man pays a price for his industrial efficiency!

Chief among them are lead poisoning, copper poisoning, anthrax, other forms of poisoning due to confining work in damp quarters, or with chemicals, paints, oils, etc. In fact, the list of industrial, or "occupational diseases" as they are sometimes called, is quite formidable.

Sanderson had an experience with an industrial disease—anthrax—one that any of you may encounter in the course of the day's work. And in that experience, he learned just what sort of diseases he was held responsible for under the workmen's compensation act and what ones he was not.

He had installed, as a part of his garage service, a paint and repair department, where old cars were repainted, re-topped and re-upholstered. Jimmy Devitt was in charge of this work. Jimmy was straight from the upholstery department of one of the big Detroit factories—and he was an expert in his line. In fact, he did so well that Sanderson was soon swamped with old cars to be rejuvenated by the talented Jimmy. They brought them in in all shapes and descriptions, as far back as a '11 model.

In upholstering wornout cushions and seats, Jimmy had to tear out the hair and wool padding used. This necessitated handling a lot of this old filth many times a day.

One day he noticed a peculiar sort of rash or poisoning on his hands. It rapidly spread all over the body and face and became so painful that he had to stop work. Jimmy had been out on a picnic a couple of Sundays before and the boys had a lot of fun guying him about getting his arm around the wrong kind of a "clinging vine." But when he went to the doc-

tor, the complexion of matters changed. That man, after watching Jimmy for a few days, announced that he was suffering from anthrax, an industrial disease peculiar to his employment.

"It comes from handling the padding in the old upholstery," he said. "It is also peculiar to the tanner's trade, or those who are called on to handle old hides, leather, animal hair and the like."

And the bad point is that anthrax, once it gets a firm hold on the unfortunate victim, is practically impossible to stamp out. It is a true industrial disease, incapacitating the employe from work and staying with him until he dies.

Sanderson had earned a reputation for just and humane consideration of the rights of his employes. He was never lax in getting compensation relief as soon as possible, where it was available.

"I don't know anything about the law," he told Jimmy's widow, "but I am writing the authorities today, and if I owe you anything for Jimmy's death, I'm going to see that my insurance carrier coughs up."

In the course of a few days, Sanderson was advised that the question of liability under the compensation act was not a hard one to determine.

"The legal definition of an industrial disease," said the commissioner, "is: 'An occupational or industrial disease is a disease caused by, or especially incident to, a particular employment.'"

"In a New York case, the court held that an accidental injury is clearly distinguishable from an injury in the nature of a vocational disease, sustained in the course of the employment, where, from the inherent nature of the work, disease is likely to be contracted.

"Our statute provides that compensation shall not be payable for injury or death caused by disease, unless such disease clearly be the result of an acci-

dent. Compensation is payable, you know, only as the result of an accidental injury or death. The question that naturally arises is whether a disease, such as anthrax, or any other industrial disease, is to be considered as an 'accident' within the meaning of the law.

"The plain purpose of the statute, in my mind, was to exclude occupational diseases from the benefits of the compensation system. Else why the specific provision contained therein? A disease which is peculiar to an employment, which science, and even workmen themselves, recognize as being peculiar to such employment, is not an 'accident.' It is bound to occur if the workman exposes himself sufficiently long to it.

"Anthrax is a disease common to only one occupation—handling old hides or hair coming from old hides. It is found nowhere else. It is not an accident. It does not seize workmen in other callings suddenly and violently or in an accidental nature.

"We feel, then, that the widow of the deceased is not entitled to compensation under the facts set out in your letter.

"It is, however, possible for diseases to be compensated as accidents where they arise under peculiar circumstances. Either as a result of an accidental injury, as where a blow on the chest causes pneumonia, or excessive exposure the same disease, or where the disease arises under circumstances clearly presupposing it to have been an accident.

"It is unfortunate that the law is so framed as to cut off this dependent from the benefits of compensation, but we can read no other intent into it than to do this very thing. In fact, that is the settled conclusion of the authorities everywhere, backed by ample court decisions in practically every jurisdiction.

"Occupational diseases are compensated only in those jurisdictions specifically so providing in their statutes."

# Boosting the "Out-of-Sight" Garage

Location of Garage Cannot Always Be Chosen—The "Out-of-Sight" Garage Must Go After Business, Tell the Public Where It Is Located, and Offer Special Inducements in the Way of Honest Service—Some Practical Suggestions

By Frank Farrington

Garages cannot always pick and choose when it comes to location. They cannot occupy the most conspicuous situations right on the corner along the boulevard. There are many things to prevent. All the available locations may already be taken. Property for sale or to rent may be held by owners who will not let a garage in there. The garageman may have a suitable building of his own located in an "invisible" location.

So the man who wants to develop a successful garage business, may find himself compelled to go ahead in a situation that is not at all what he would like. Fortunately, it is possible to make a success of the business in an undesirable location and many garages that are out of sight from any road or street, are being successfully operated to full capacity.

Since such a garage cannot hope to secure any business from motorists who might stop wherever they found a shop, it must make its presence known by such means as it can. It must go after the business and tell the public where it is located and what advantages it offers.

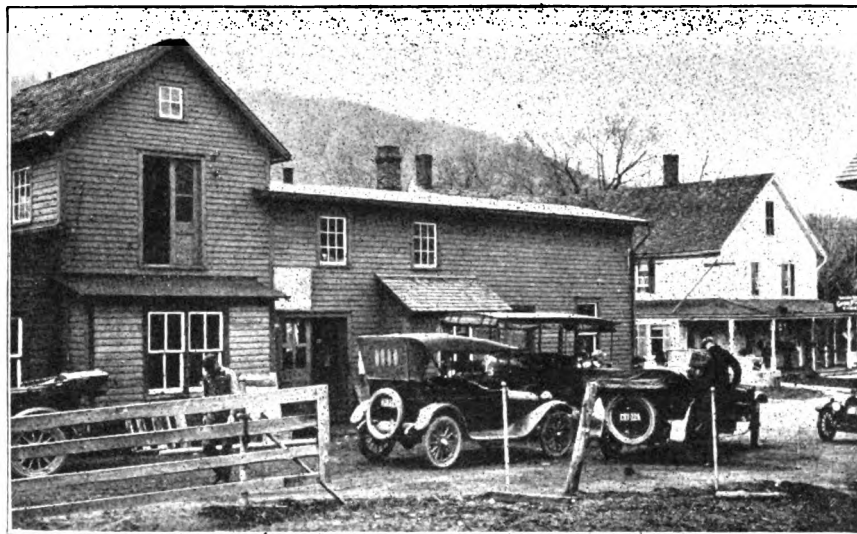
Of course, there should be a sign advertising the garage at the nearest point on the street or highway. If the garage is on a back street, it is a good plan to put a sign at the corner of that street and the main thoroughfare, "250 Feet to King's Garage," with an arrow pointing the way, and a street sign at the garage, so plain that no one can drive past it.

When the garage is back from the road in a country district, and perhaps is not even visible from the road, don't stop with merely a good sign at the nearest point on the road. Put signs a quarter of a mile out in each

direction: "¼ Mi. to King's Garage." At the location of the garage, use a sign: "Entrance to King's Garage."

If you use separate driveways for entrance and exit, use plain signs over each so there will be no mistake.

The generous use of such signs is absolutely essential to the garageman who is going to make a success of the business in an out-of-sight location.



An Example of the Out-of-Sight Garage. This Place Carries on a Very Profitable Business Back of a Farm House.

He must make it easy for people, who have heard of him or who have seen his advertising, to find his place of business. He must make it so easy that they will find it almost impossible to miss it. There are plenty of motorists who are none too clever at finding what they are looking for.

The "out of sight" garage, even more than others, should do high grade work. The garage right on the busy corner, passed by hundreds, perhaps thousands of automobiles daily, can do slipshod work and get away with it. It gets so much transient business, so much business just because it is in a convenient location that car owners will say, "Oh, well, here's Jones' right here. I guess he'll do this all right," and they take a chance.

But the man they have to drive a half mile out of their way to reach, must offer some additional inducements.

There must be good and sufficient reason for going to him. First-class service, high-grade, honest workmanship, even though prices are no lower than others, will bring motorists to you wherever you may be.

The country is full of automobile and truck owners who value their cars so highly that they are looking for mechanics who will give them honest service and intelligent treatment.

The first thing to do to prove that you are giving high-class service is to give it. You cannot prove to a man you are running a first-class garage unless you are doing just that. You have got to deliver the goods in order to get the reputation for doing it. Just as soon as you know you are doing work the way it ought to be done, and giving the right kind of satisfaction to your patrons, or can give it if you can get the patrons, then you can begin to advertise that fact.

One of the best ways to interest motorists is by letters to them—personal or typewritten letters.

It will pay to buy some good duplicator just for this use. If you will send out a letter every week to a list of the motorists in your community, in a few months you can be sure of having all the business you can take care of. Just keep hammering away. One letter, or two or three, sent out spasmodically will not accomplish much. They might bring in a customer or two, but they will not build up any business. Write them such letters as the following:

Dear Sir:

Every automobile is worth good care. The better the car, the more money you make by taking good care of it. With prices where they are today, it is only

good judgment to make an automobile last as long as it possibly will.

And everyone wants a car to give good service and run well as long as it is in use.

Whether you are going to continue to use your present car or get a new one, it will pay you to keep the car in the best possible condition.

Nothing goes down hill faster, depreciates more in value, than an automobile that is not kept in good condition.

Therefore: You want the best class of work done on your car! You want honest workmanship and first rate material. You want to know that you are going to get these without having to stand over the car and watch what is being done to it. We are here to give you just the type of service you want—the best. You can depend upon our garage for honest values and an hour of work for every hour charged on your shop time slip.

Drive around to our place....(address)....and let us see what the car needs. If our garage is a little bit out of your way, bear in mind that we have a telephone (4572 Main), and we will call for your car and bring it home when you say.

In our location we are not rushed by transient jobs, and we make a specialty of good work for local motorists.

"When a car owner gets a letter like that, typewritten (or imitation) on good stationery, which looks like a high grade proposition backed by a real business man, he feels that he has found a place where he is willing to trust his car. You know, there are garages where a man does not feel just that confidence.

If this letter is followed up with subsequent letters of a similar type, all of which will emphasize the high class idea and the honesty basis of service, there will certainly be results.

Suppose you have a form of card printed for use at times when you see in the future a period when you will be able to take on some extra work because of a little slackness in business. Such a card might be printed about like this:

Dear Sir:

Next week we shall have a little open time when we can take on two or three cars for special jobs, such as mid-season overhauling, cleaning and lubricating engine, transmission, differential.

Perhaps there is some work you have been planning to have done when it could be done without delay. Telephone us before too many get ahead of you.

This might be a mailing card, or a regular government postal card, or a card with an envelope to match. Just date the cards and fill in the names and send out enough to bring the business you need to fill up the week. If too many orders come, of course, you can take them in order and express

your regret to those who come too late to get in on the date mentioned.

There is good psychology in this little plan. It gives the impression that you are well occupied with business of a desirable type, and it makes people want to get that which is not easy to get. If they can get work done at your garage at any time, they will not have that feeling that your services are in demand beyond what you can do.

The man who is building up a business in a backyard location will at first have time to devote to getting his premises in shape. If business is a little slow in coming at first, it may be just as well. There will be a chance to make the place attractive by doing things that do not take much money, but that are appreciated by the motorist.

The surroundings may be cleaned up and vines and shrubbery planted where they will not interfere with work. Paint can be applied to the buildings by anyone in the shop at odd times. Office and toilet and stock-room can and should be maintained in such condition as a business man, rather than a blacksmith would keep them.

There are so many blacksmith shops taking up automobile repair work that the garageman ought to have a pride in making his place look like a higher type. Motorists who can

afford to pay good prices for good work are becoming accustomed to garages where there is more of the neatness of a business place and less of the untidiness and dinginess of a boiler shop.

You can develop a profitable business, probably, without paying any attention to your surroundings, but you will get more business and a better class of business, if you see how attractive you can make the place.

There are garages where a man who drives in, in a neat-looking car and gets out of it wearing a nifty-looking, light suit of clothes and clean gloves, expects to be blackened and spotted by contact with something before he gets off the premises. In such garages, that man is rarely disappointed, if he touches anything or even takes change from the garageman's hands. Just because shop work is greasy, dirty work, is no reason for thinking that there can be no cleanliness or tidiness about the place, and a clean, spick and span garage will do a lot in attracting motorists from off the main route to patronize it.

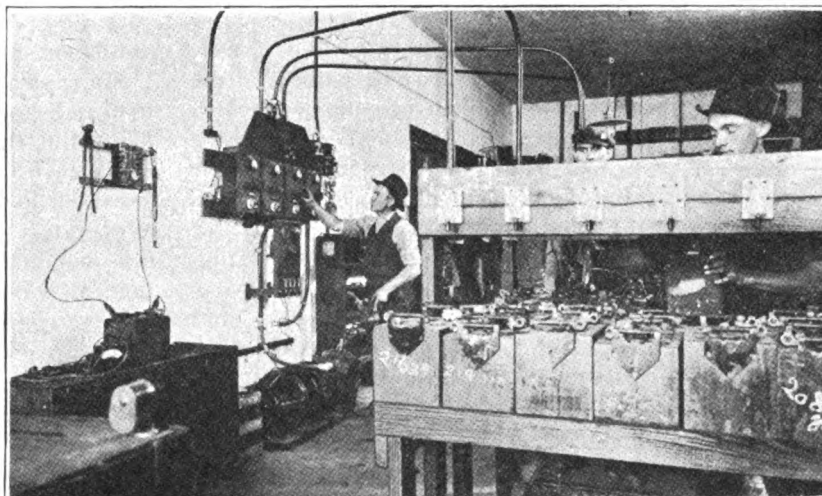
The "out of sight" garage can get all the business it wants. It may require a little more effort to get the business coming to such a place, but any man who can render superior service can be sure people will go out of their way to do business in his garage, for real service always pulls.



An Attractive Garage Known as the Auto Cleaning Co. Which Specializes in Automobile Cleaning, But Also Does General Business—The Roof is of Green Composition Shingles—The Design Can be Added to Many Garages With Attractive Results. The Front is of Cream Cement, Walls of Red Brick—Capacity is 50 Cars—A Neat Sign on the Front Wall Makes an Appealing Advertisement.



# B A T T E R Y



# S E R V I C E

Operating Plans of Battery Service Stations—Types of Equipment for Charging of Batteries—The Fuel-oil Engine as Motive Power When Electric Current Is Not Available—Equipment and Repair Parts Necessary for Complete Battery Repair Service—Second of a Series of Articles

By Vincent W. Cunningham

Battery service stations may be conducted under either one of two operating plans. One makes use of but the simplest electrical equipment and requires only a small outlay to install it, while under the other the station may be made as complete as the manager elects to make it.

The first plan may be called the "Service Dealer" plan—and is backed by at least one of the prominent battery manufacturers. According to the scheme of operation, the dealer may be situated in any town, where the battery manufacturer has not provided a service station.

The dealer sells batteries, operates a small charging outfit, and carries a few rental batteries. These are for the convenience of his customers and for their use while repairs or adjustments are being made on their batteries. The "service dealer" is expected to be able to take hydrometer readings and to make battery terminal connections, but he is not expected to open up and repair the battery internally.

Should a battery fail to charge properly, the service dealer forwards it to the nearest service station, which, as previously indicated, is operated by the battery manufacturer. Here all necessary equipment for making repairs is maintained. The service station carefully examines the battery and sends a report of the repairs necessary, and their approximate cost, to the service dealer, who communicates the information to his customer.

No repairs are made on the battery by the service station until the service dealer orders them. An attractive commission is allowed the service dealer on this class of repair work, and liberal contracts, easy in terms and requirements as to batteries carried in stock, are offered to the prospective service dealer.

As previously stated, the electrical apparatus required to operate as a service dealer, is of the simplest kind and requires the least cash outlay to install. A motor-generator charging set is about the simplest installation possible, and may be had in capacities suited to the needs of the service dealer.

Motor generator sets are marketed of a size sufficient to charge from one to four six-volt batteries, while others are of such a capacity that 30 six-volt batteries may be charged at a time. There are about eight other sizes of charging sets lying between these maximum and minimum sizes.

It may be remarked that motor-generator sets are provided with alternating current motors, operating at voltages of 110 to 220 volts. As the use of alternating current is widespread through the land, the operation of these sets from almost every electrical power line is possible.

Battery charging with modern generator sets is simplified by the instruments accompanying them. Knowing the charging current desired, the attendant must only regulate the rheostat to cause a current of the proper

value to flow, as shown by the ammeter. The use of automatic cut-outs in the charging circuit eliminates the possibility of the batteries being ruined through discharging back through the generator in case of an accidental shut-down or shut-off of power on the line.

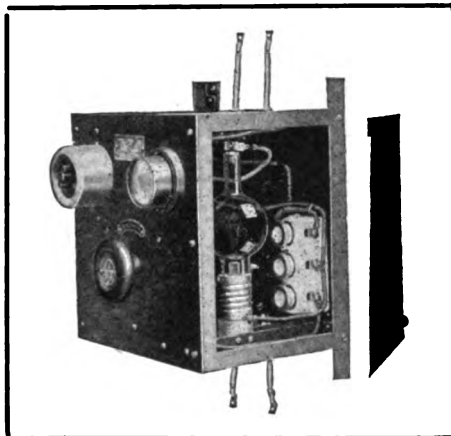
Considerable may be said in favor of the type of alternating charging apparatus known as the rectifier. This operates on an alternating current circuit, converting or rectifying the alternating impulses to produce the direct current necessary for battery charging. The apparatus has a strong factor of reliability and is efficient in operation. The capacities of a certain line of rectifiers now on the market range from one to six, six-volt batteries.

Rectifiers compare favorably with motor-generator sets in that for rated capacities the rectifier retails at a lower price and is simpler in construction, operation, and maintenance.

Motor-generators, then, and rectifiers, are the charging mediums to be used with alternating current supply. In some places, close to the electrical power house and in congested districts in certain towns and cities, we find, however, that direct current is obtainable but not alternating current. The charging process is even simpler in this case, involving merely the completion of the electrical circuit through the batteries, adjusting by means of a variable resistance or a lamp load, the voltage and current which is to

be passed through the battery circuit.

Another method of battery charging may be well worth mentioning, for it shows the practicability of operating as a service dealer far from any



**Trouble-Shooter Detects Damaged Cells.**

source of alternating or direct electrical power. The plant, to which reference is made, has operated for a number of years. It has charged and kept up a large number of batteries both for gasoline and electric cars, which indicates in a way, the amount of energy required. The source of power was a two-cycle fuel-oil engine operating with hot-bulb ignition, and it proved most satisfactory in its operation. To the engine was belted a direct current generator, which was connected to the batteries in the usual way.

The power plant, which required little attention, ran 14 hours a day, and burned crude or fuel oil. That its operation is economical is proved by the fact that it ran for eight years in competition with an alternating current supply line, not 100 feet away! The operation of this equipment shows that the presence of electric power on the garage premises is not necessary to operation as a service dealer.

With the additional equipment of voltmeters, ammeters, hydrometers, batteries of popular types, some new batteries to take care of trade-ins, etc., the service dealer is amply able to take care of his share of battery service.

The charging equipment of the service station where complete battery repairs may be made, is of the same general character as that installed in the service dealer's garage, varying in capacity according to the de-

mands which service imposes upon the plant.

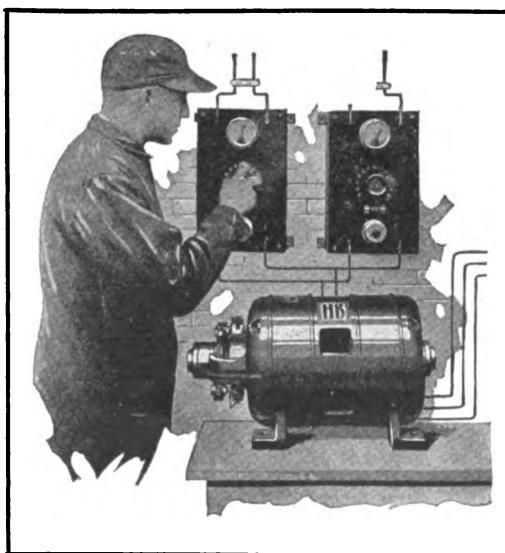
In general, it may be stated that the service station needs equipment which facilitates repairs, and any device which will do its part to save labor, and do it economically considering its first cost and upkeep, is a device worth installing. Then, too, such a station requires a varied stock of repair parts for batteries, such as positive and negative plates, separators, rubber jars and covers, leads, etc.

This stock ought to be sufficient to handle the repairs of the majority of batteries, in the locality, considering their differences of type and construction. Much equipment for makes of batteries not standard, or not popular and in wide use in the community, should not be kept in stock—it may stay there.

Equipment for battery repairs, both necessary and convenient includes: Torches for burning lead connections, used in breaking up and assembling the battery connections. The battery steamer is a practical device, as well as a time saver. The whole battery is placed in the steamer and the compound, which seals the battery cells, is quickly and easily removed.

Many otherwise useless plates may be given a new lease of life by the proper treatment with a battery plate press, by straightening them and forcing the paste back into the lead grids. Battery turn tables save the workman's time and conserve his strength.

Scrapers, files, brushes, acid-proof paints, burning leads, molds and special tools are of the greatest possible use. The largest shop naturally en-



**Battery Charger of Motor-Generator Type.**

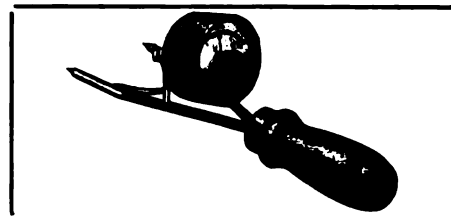
joys the greater number of these time and labor savers.

Many smaller items might be added to this list, such as reamers and the like. But the purpose of this article has been fulfilled in bringing out in a general way, the equipment required to operate a garage battery service station and to fit it up ready for operation, at a cost not prohibitive to the average garage owner. Equipment costs are mounting, it is true, but profits are tending to hold their own.

### **Cozy House on Wheels with Unique and Interesting Features.**

A unique automobile is that owned by W. J. Moore of Caro, Mich. The car was designed from specifications made by Mr. Moore and has many features that contribute to the comforts of long journeys.

The chassis was made to order by the Cadillac Motor Co. It has a 144-inch wheel base, while the engine is



**Trouble-Shooter Detects Damaged Cells.**

patterned after the style of the Cadillac eight-cylinder engine. The limousine body was made by a Chicago firm.

The seats are arranged similar to those of a Pullman coach, with a capacity for seven persons. Each individual seat can be turned to face in any direction or can be moved forward or backward, or taken out entirely.

There are also two folding couches or beds. Back of the rear seat is a refrigerator and kitchenette.

Under the seat is a folding table which, when placed in position, will carry glasses or cups filled with liquids, and the contents are undisturbed, even when the car is moving at a speed of 25 miles an hour. This is due in part to the heavy pneumatic springs, a part of the unusual equipment.

There are also two electric fans and the car has a telephone system which permits an easy telephone connection with telephone lines anywhere with communication direct from the automobile. A periscope is placed in convenient position for the driver.

# "Aint It Funny You Dont Notise?"

There Wuz a Ded Rat in the Salesrume an' Nobody Had Notised It—An' It Wasn't Only Smells, There Wuz Boxes of Ajustibel Renches on a Top Shelf that Wuz Fergot—Fokes Ought to Be Watchin fer Things They Dont Notis

By Frank Farrington

Deer Pete:

Its a funny thing the things you dont notis in your own garaje issent it? Yesterdie the morning the boss blew into our sales rume and I herd him say to Persy, "Gosh I was in the Sentral dry goods store this morning on the way down and what a smel! I should think a store woodent hav a smel that smels like I dont kno what."

Woodent that maik a feller kind of curious? So when I went out on an errrend I just stoppt into the Sentral and smelld once for luck. It did smel prettie rotten. Ile say so. I gess a gass mane leekt. But noboddy working there seemd to notis it but they all lookt dopey and I got out without ennyboddy trying to sell me ennything.

But the funny part is yet to cum. When I cum back to our plase I was by the sales rume dore and prettie soon two classy ladies cum into the sales rume.

When they got inside I herd one of em say to the other, "Gcodniss, a ded rat I gess!" and they hurried to get by the smel, but it must be they didnt get away from it becaws it wassent long before they went out and they haddent seemd to get interested in enny of the cars that Persy tride to show em. And when they went out they held their noses high enuf so they cood hav smelld ennything on the top shelf if it was there.

I took a snif or 2 and I coodent smel ennything and I askt Persy and I called Bob in and askt him, but I gess they must hav bin as bad as me. I askt Dazie and she rinkled up her pug noze and finelly she sed, "semes to me there is a kind of unplezzant odah."—Just like that—odah.

So I went and talkt to Bob about it agen and I sed, "Bob they certainly is a smel in the sales rume that fokes

dont like and the wimmen that cum in they go out agen as fast as their legs can carry em. Ime going to get Teddy Barnes to cum and have a smel." Teddy is the delivery boy in the drug store next dore.

So I got Teddy and he sed, "Gosh, I shoold say it is a smel. Whats dide on you?"

Wel, it was a ded rat in the wall and I gess it had dide so gradual that weed got used to it and diddent notis

had hung in one corner of the offis until it was the dirtiest, fly speckiest thing you ever saw. Just becaws it was in a plase where noboddy happend to bump into it we diddent think about it. Then there was a sine in a fraim that hung in the sales rume and the sine was torn and falling out of the fraim and noboddy had sents enuf to see that eether.

In the end of one window there was a calendar, a big advertising calender and it was-sent moren a month behind the times. There was a littel peece of loos iron on the doresil to the salesrume and if you diddent step high you cawt your foot on it and we diddent notis that becaws weed got used to stepping high there. There was a muzzlin sine outside and one end of that was loos and flapping in the wind. And Ile be darnd if the offis clock haddent stoppt

but I gess weed hav notist that when we got hungry.

I dont kno how menny things I found like that. I kno when I told Bob about em all, he sed he gesst it wood be eezier to tare down the old shanty and start over than to fix all those things rite. There ought to be sumboddy around every garaje whose bizness it wood be to see about all such things. The boss is too bizzy sumtimes and the rest dont care. I think every feller around our plase and Dazie too ought to be watching out for things they dont notis. Ime that way.

Speeking about investigaiting, I was poking around one day seeing what I cood find in the back store rume. You see the boss in a big garaje like ours cant kepe watch of everything and sum of the fellers he leves it to go to slepe on the job. Not me. I do my sleeping nites.



"I Herd One Lady Say to the Other, 'Goodniss, a Ded Rat, I Gess.'"

it. What do you think of that? Semes to me a feller running a garaje never thinks it matters what a garaje smels like in the offis or sales rume or ennywhere just becaws its a garaje. But I dont see enny reezon why peepel wood like a bad smel of ded rat enny more when theyer buying automobileels and such things than when theyer buying silk stockings.

I gess you get so used to the smels in your own plase of bizness that you dont kno whether theyer good or bad, but buleve me your customers kno all rite and they dont like a bad smel here'er ennywhere.

And it aint only smels you dont notis eether. That smel ideeah got me thinking about what we notis and what we dont notis around our own plase. So I went looking around a littel.

The first thing I saw was an advertising hanger about tires and it

Wel, as I was going to say, I was poking around that back rume just seeing what I cood see and I saw a top shelf that lookt empty enuf but it was so wide and deep that I wassent shure. So I got a step ladder and got up where I cood see. Wel there was sume boxes on the back side of the shelf all cuvverd with dust and they were boxes of adjustable renches just as staple as the wheat, or shuger eether, only if theyd bin shuger they woodent hav bin forgot and left there.

I called Bob out and askt him what was the big ideeah in saving all those renches. Was he hoarding em so whoever bought the shop when the boss dide wood get a good bargain? He

askt me where I found em and I told him. He sed, "Gosh, theyer worth twice what they was when they went up there. Go and find sum more."

Wel, I coodent find enny more but it turned out prettie lucky those was left up there to dry while they got worth more munny. Ile tel the world sum fokes is born prettie lucky. There was the boss maiking munny while he slept, just like a kaskaret.

But Ile bet he wont leev enny more top shelvs go for yeers agen without looking on em, and Ile bet it wood be a good thing for any garaje to not have such deep shelvs that you cant see to the back of em. The boss ought to have sumboddy like me just to go around and see what he can find that

the other fellers had forgot about.

That tawt me a lessun all rite. I went home that nite and lookt on all the top shelvs in our house and I found enuf stuf to start a rubbage sail and ma told me to put it all in the woodshed, but pa sed "Hold on and Ile look that over." And the last I new paw was pawing that old stuf over and asking ma what the dickins she was waisting all those good things for and she was telling him if they were so good to tel her what they was good for and pa was trying to think. That just goze to sho that sum rools thats fine in a garaje aint worth a thing at home. Aint it so, Pete?

Yours til the cows cum home,

BILL.

# The Silent Business Stimulators

Alluring Window Cards Announcing Special Features of an Accessory Sale or Dealer's Policy Are Very Successful in Attracting New Patrons Who Become Regular Customers—Some Suggestions for Window or Display Card Copy

By Geo. C. Mason

The dealer in automobile tires and supplies will find it to his interest to use attractive window cards, calling attention to his business. A good card is a silent, though very successful, salesman and will serve to introduce many new patrons to your store, many of whom, if you furnish them an object in so doing, will become regular and profitable customers.

Some suggestions for new card copy for either window or inside display, are herewith offered. It will pay the dealer to make use of such as may appeal to him.

**This is the Purchasing Place  
Of the Particular Auto Man.  
Our Goods Stand Up  
When Others Falls Down.**

**These are Genuine,  
We Stake our Reputation on That.  
The Kind You Always Wanted  
But Couldn't Always Find.**

**Life is full of Sunshine,  
The Ocean's full of Salt;  
No Matter if you're hard to Please,  
With us, you'll find no Fault.  
Always Right there, all Right,  
With Everything to Keep  
The Auto World Moving Onward.**

**Special Tire Offerings.  
An Early Inspection,  
And Prompt Selection,  
Insure the Greatest Satisfaction.  
Right Now is the Time. Come In!**

**An Unusual Sale of Auto Accessories.  
Don't be Bashful!  
All the Wise Ones are in on it.  
Why Stay Out in the Cold?**

**This is the Auto Supply Store  
For Those Who Know Best.  
Those Who Don't Know  
Will Soon Learn.**

**Worth Knowing!  
When you Know What you Want  
And Want What you Want  
When you Want it,  
And Don't Want a Substitute,  
We Usually Have it  
If it's in our Line. Ask Us!**

**Never Pass a Good Opportunity.  
Here's one Right Now!  
Wise One! Come in.  
It's a Good Buy.**

**If You would have the Best  
At a Price that is Right,  
You Simply Must,  
Buy your Tires and Accessories Here.**

**We're in this Business for Business.  
We want your Business.  
With Goods and Prices Always Right  
We Deserve your Patronage.**

**Remember this!  
It isn't always the Size  
Of the House that Counts.  
It's the Size of the Man  
That Runs it.**

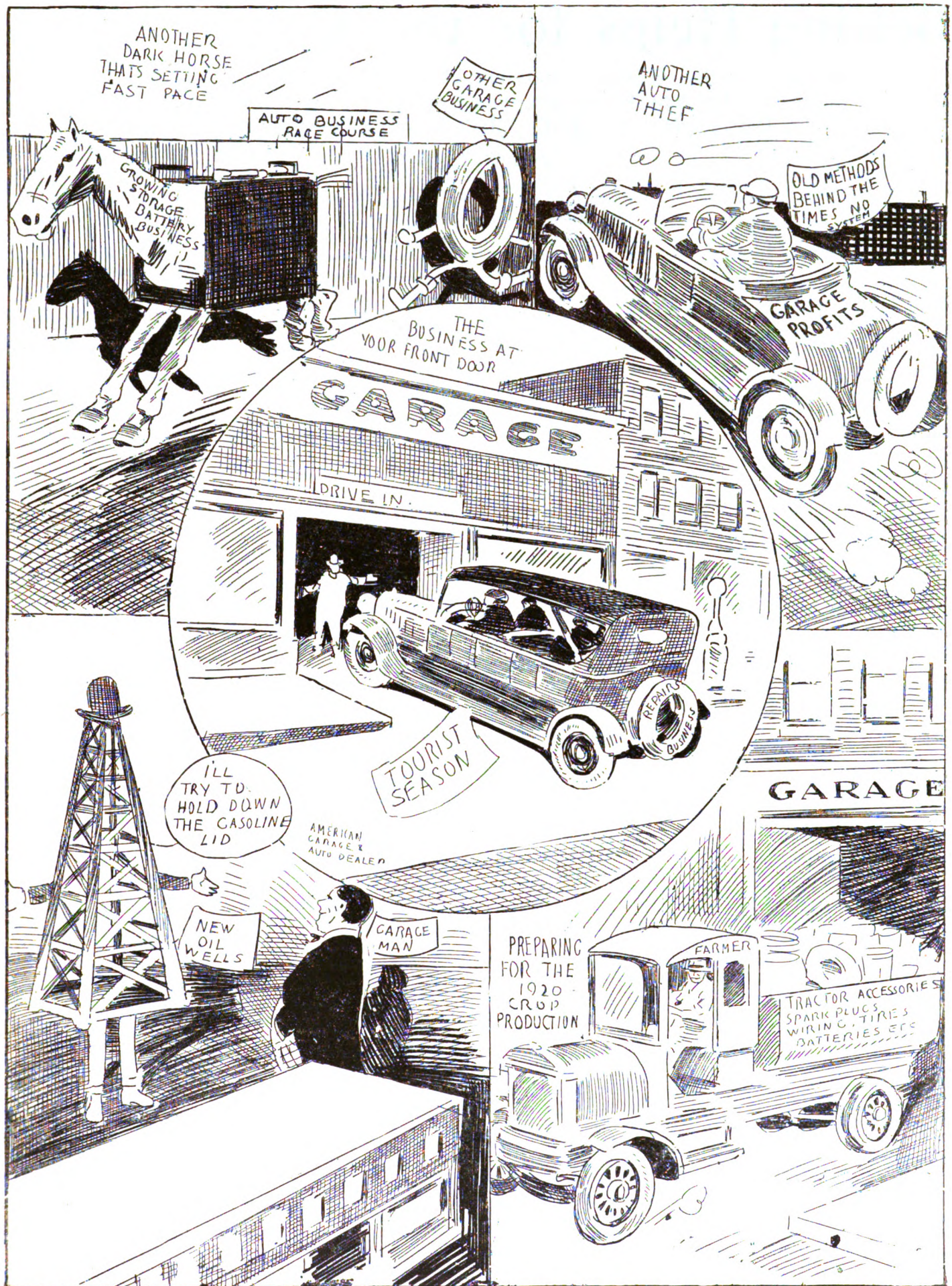
**It Can't Be Done!  
You may try Elsewhere to find  
Better Goods or Lower Prices,  
But it Can't Be Done.  
We buy Right. That's why  
We can sell Right.**

**Be Happy to Live,  
And Live to be Happy.  
This is the Auto Supply Store  
With a Conscience.**

**Don't Worry about Auto Expenses.  
We have what you Want  
At a Price you'll be Willing to Pay.**

**Don't be a Grouch!  
Grouchy People are never Well or  
Happy.  
Buy Your Auto Supplies here.  
Then you'll carry a Joyful Heart  
And wear a Smile of Satisfaction.**







# Belting Helps for the Repair Shop

How Leather Belting Is Made and from What Portions of Hide the Best Belting Is Cut—Rules for Determining Length of Belts for Special Purposes, Belt Speed, Horsepower, and Width—Methods of Joining and Lacing Belts

By J. N. Bagley

Few users of leather belting know how it is made, or why a belt cut from a certain part of a hide will give more and better service than if cut from some other part. Many men have devoted the greater part of their lives to the manufacture of leather belting best adapted for a certain work.

It is self-evident today that the efficient transmission of power cannot be attained from the use of the old-fashioned, haphazardly-made belting. Manufacturers of the present day have found from experience that belting must be standardized just the same as any other tool or implement on the market, in order that the user may be insured maximum production from the standpoint of an investment.

Many of us can remember in the early days when Frank Smith or Bill Jones would cut his belting from the hide and glue or lace it to the proper length. The result was a belt that would stretch in spots, go crooked in others, and show up spongy in a third. The trouble was in cutting the belt from the wrong part of the hide.

This only goes to prove that the standardizing of belting is absolutely necessary, for two belts working under like conditions should vary but little if any. Practical observation and scientific study, together with tests under varied conditions, are the things that will enable the

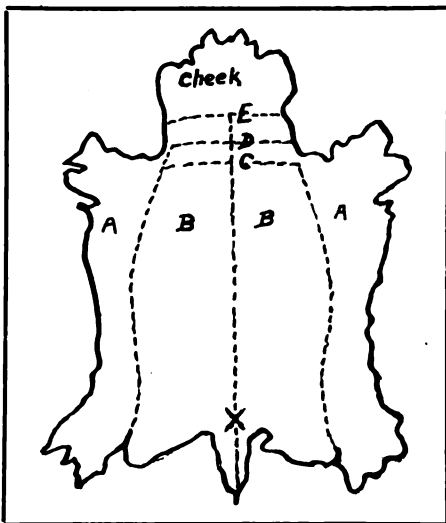


Fig. 1—The Hide Before It Is Cut.

belting manufacturer to furnish to the user a standardized belt for a special purpose, which will give the greatest service that it is possible to get from leather.

In Fig. 1, we have a very good repre-

sentation of a hide before it is cut. The portion shown at B, between the two belly parts, is known as the "butt." When split down the center, as indicated by the dot-

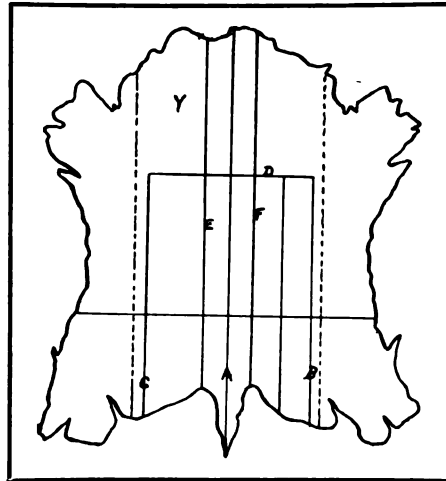


Fig. 2—Parts for Different Grade Belting.

ted line marked X, the two pieces are known as "bends." The two pieces indicated at A are what is known as "belly of-fal." Now if we should cut at dotted line C, we would have a portion termed the "range," or taking in the entire hide, as indicated by dotted lines C, D, E, we can term it the "shoulder." Again we might cut the range off, and all that might be left would be termed the "cheeks and faces" with shoulder attached.

The most valuable parts of the hide for cutting the different grades of belting are indicated in Fig. 2. That part of the hide indicated by the dotted lines is used for the lower grade of belting while that enclosed by lines C D B is used for the better grades. Should the neck be used for belting, it would be full of small creases and wrinkles which would show in the finished product, regardless of the care exercised in manufacture.

The center of the hide, as shown at A, will stretch the least and will have a tendency to remain absolutely straight so long as the distances on either side of A are the same width, as shown at E and F. But should we cut a belt having one edge at E and one at B, one side would have more stretch than the other; that is, the belt would curve slightly, as the side B would stretch more than the side E.

The leather is usually stretched after it is cut into strips and not as a whole in the hide. Thus a belt that is straight when rolled in the coil will, on being unrolled,

be found to be curved. One will observe, also, that each time the width of a strip is reduced, the curving will subsequently take place regardless of the width. Should it be necessary to cut three, four-inch belts out of a single 12-inch belt that appears to be straight, it will be found that after a time every one of the four-inch belts will curve and no two will have the same curve.

The reason for this fact is practically obvious. It is plain that the edge that was nearest the line A, Fig. 2, offers the greatest resistance to stretching. When either of the three strips are stretched straight it is evident that an equilibrium of tension is induced. Hence reducing the width destroys to a certain extent this equilibrium, and the tendency is for the leather to resume its natural conformation.

After the leather has been stretched in strips, the allowance for stretch over pulley can be determined with some accuracy. For example, a tape measure may be stretched around the pulleys tight and the belt cut to the length of the tape, as the stretch of the belt will be very near that of the tape line. Of course, judgment must be exercised in some instances where a slack belt is to be preferred, and the thickness of the belt must also be considered.

Many times it is impossible to determine to just what stretching the belt has

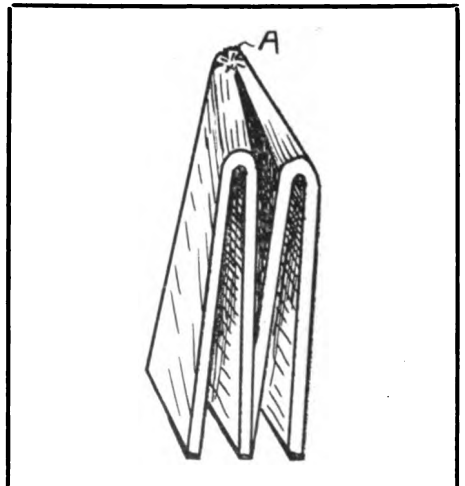


Fig. 3—Leather Folded With Grain Side Out.

been subjected. The workman usually relies solely on his judgment, following no fixed rule. Should the belt be a narrow one, it may be placed around the pulleys and stretched by hand and cut short about

2 per cent of its length for stretching.

After the belt is put to work, the stretching proceeds quite rapidly if it has not been stretched in the cut strip. On the other hand, if it has been reasonably well stretched in the strip, it may run for days, or even weeks without developing slack sufficient to require a new lacing. Referring again to Fig. 2, we find that the least stretch is at line *A*, and the greatest stretch at *C* and *B*.

The single-ply belt is one composed of a single thickness of leather properly put together to form a belt of necessary length. The manner of putting together, however, may vary—that is, it may be laced, pegged, or glued, as the case may be.

A double-ply belt is very similar to the single-ply belt, except that two pieces of leather are cemented together the entire length. This style of belt has its advantages. If properly made, the strips may be so arranged that the belt will remain practically straight for any

ing eye, multiplied by the number of turns made by belt. This product multiplied by the decimal 0.1309 will equal the length in feet very closely.

Many users of belts do not stop to think that the grain or smooth side of the leather is the weaker, but this may be readily seen. If a piece of leather is chamfered to a thin edge, then the grain side will tear almost as easily as paper, and a great deal more easily than will the flesh side under the same treatment. It will also crack more easily, which can be proved by the following experiment:

Take a piece of leather and double it, as shown in Fig. 3, with the grain side outward and it will crack at *A*. Now with a similar piece, double it with the flesh side out and no cracks will appear. This proves out in passing over pulleys, while, of course, it is greatly exaggerated in the test experiment. Should we cut a piece of leather and make a close examination, we find, extending from the grain

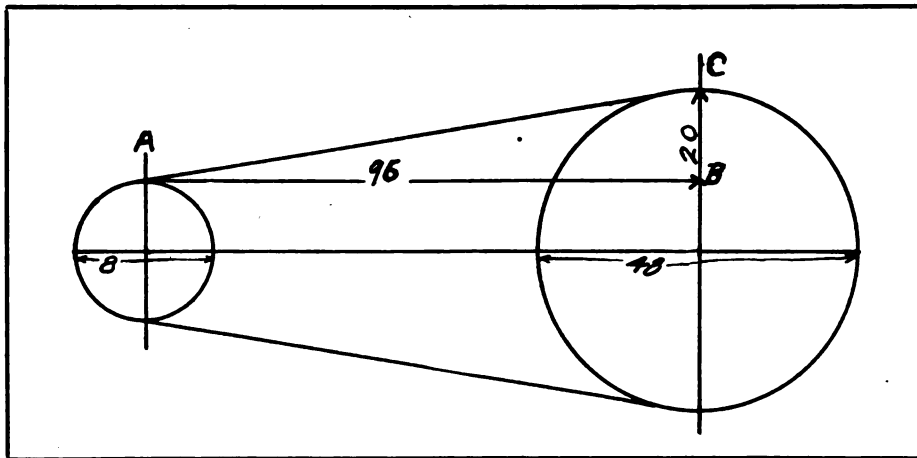


Fig. 4—Determining Length of Belt for a Given Purpose.

time. This may be explained by referring again to Fig. 2. At *A* we have the dividing line, or, in other words, the stretch at this point is equal, while at *E* and *F* the stretch is somewhat greater.

If the strip indicated at *E* and *F* should be cut out and used as a belt, the stretch would be the same at either side and the belt would remain straight, but would have the greater tendency to stretch and the two strips would curve toward each other. If we should turn one of the strips and cement it directly over the other, we would again have a belt with the stretch on both sides equal as well as a double or a two-ply belt, as we term it. Therefore, one will readily see that the chances are greatly in favor of a two-ply belt. The chances are also greatly in favor of a two-ply belt, so far as curving goes.

Belts are usually made up in long lengths, coiled up in rolls for ease of transportation, storing, etc. In case it is necessary to determine the number of feet in a roll of belting, the following rule will apply, in case the belting is coiled closely:

Diameter of the roll in inches, includ-

side inward, a layer of lighter color than the remainder of the belt. Therefore, the whole layer is less fibrous and much weaker than the body of the belt, the stronger part being on the flesh side.

If we take a piece of belting and shave the grain side very thin, and then stretch it tightly, we will find a small network of holes showing very plainly where each hair was located. It is readily seen that here we have weakness, more liability to crack, especially if the pulleys are unusually small.

The grain side of the belt should run next to the pulley, because it lies closest to the surface, giving a much better contact over a given area. Examination will show that some of the better belts have the grain side cut away entirely and the two placed together and cemented. This gives a double belt with wonderful wearing qualities. A double belt made up in this manner will not stretch in comparison with the belt which does not have the grain sides cut away.

By carefully observing the following rules it is an easy matter to determine the length of a belt for a given purpose:

Since the stretch of a belt is variable, as already explained, no rule can be given as to the amount which the belt should be cut shorter than the measured length around the pulleys. It follows, therefore, that only good judgment can determine the amount to shorten the belt. In ordinary practice, the belt is slipped over the pulleys and the length determined, but in some instances, it is necessary to make up belts before the pulleys are in position.

For open belts, let the distance between the shaft centers, as *A, B*, Fig. 4, be the base of a right angle triangle, and the difference between the semi-diameters, as *B, C*, the perpendicular. If we square the base and the perpendicular, the square root of the sum of the two will be the hypotenuse and this multiplied by two and added to one-half of the circumference of each pulley, is the required length of the belt. Considering the fact that the belt has been stretched after cutting from the hide, it will still be long enough that just enough should be cut to give the required tension.

Example: We have the distance between centers in Fig. 4, as shown, 96 inches. Diameter of large pulley, 48 inches. Diameter of small pulley, 8 inches.

Squaring the distance between the two centers, or 96 times 96 = 9,216. Square of perpendicular, or 20 times 20 = 400. Square of distance between two centers plus square of perpendicular equals 9,616. Square root of 9,616 is 98.06 plus. This number times 2 is 196.12.

Half the circumference of the large pulley is 75.29. Half the circumference of the small pulley is 12.46. Therefore, 196.12 plus 75.29 plus 12.46 equals 283.87 inches, or 23 feet, 7 7/8 inches; this is the required length of the belt.

The following rule, while not quite as accurate as the one just given, is sufficiently accurate for all practical purposes:

Take the diameter of the two pulleys and divide the result by 2, multiply this result by 3.25 and add the product to twice the distance between centers between the shafts and the result will be, approximately, the required length of the belt.

Example: Referring to Fig. 4, diameters of pulleys 8 plus 48 = 56. One-half of diameter of two pulleys is 28; 28 times 3.25 is 91. This amount plus twice the distance between the shaft centers, or 91 plus 192 is 283.00 inches, the required length of belt necessary for practical use.

Should there be need for a crossed belt with the diameters as shown in Fig. 4, the following rule will apply nicely:

Square the diameter of the large pulley and the distance between centers. Add together, and extract the square root. Square the diameter of the small pulley and distance between centers. Add together and extract the square root. To the sum of the two roots found, add one-half the circumference of the two pulleys. The

(Continued on page 60.)

# Welding, Cutting and Brazing Practice

Practical Aluminum Soldering Methods for Garage Repair Shops—The Soldering Iron and Welding Torch Methods—Similarities of Two Methods, Fundamentals Being the Same—Composition of Solders and How Made

By David Baxter

The soldering of aluminum has now become a quite common practice in many repair shops, although for years it was thought impractical, if not impossible. The reason for this seeming prejudice probably dwelt in the fact that incorrect or ignorant methods were applied. However, the recent years have brought greater knowledge and better methods, so that now the process is quite simple.

This kind of repairing is not to be compared with oxy-acetylene welding, nor is its use recommended where the welding process is available. There are occasions, however, when aluminum soldering is more desirable than welding due, in the main, to the ease with which it is accomplished. Then, too, the soldering can be done with the welding torch instead of the soldering iron if the former is preferred—or a combination of both may be employed.

The welding torch operator is, therefore, the logical man to do aluminum soldering. Every welder doing custom and automobile welding or repairing should know how to do this class of work, both from the standpoint of being able to do any kind of repairing that comes along, or that his customer wants, and because instances may occur anytime where he will find the process most desirable in regards to the element of time saved.

To help him fill this demand, one method of aluminum soldering that is simple and inexpensive, and yet should meet all requirements if the proper solder is used, is described. This method should fit nearly all shop conditions and equipment in the average garage repair department.

As has been stated, aluminum soldering is particularly suited to the welding shop, but on the other hand, with aluminum soldering, the welding torch may be entirely omitted. The fundamentals of the process are the same whether a torch or a common soldering iron is used. Soldering with the torch is probably faster and more certain, but the use of the soldering iron makes a dependable job.

Perhaps the chief item in favor of making a soldered repair is the fact that the welder does not have so much aluminum oxide to deal with, which is one of the greatest causes of failure in aluminum welding. Aluminum soldering can be done with little trouble, while the welding of aluminum is often very difficult on account of the metal being badly oxidized. As the solder will melt and adhere quite easily, it is often necessary to puddle and

otherwise manipulate the aluminum when welding it.

It must be remembered that a soldered joint will not be nearly as strong as a weld. The solder is merely melted to, or stuck to, the surface of the joint, while a good weld is, in reality, a part of the whole; in other words, sides of the fracture and the added metal are one in a successful weld. Therefore, it stands to rea-



Fig. 1—The Crack, Cleaned and Grooved, Ready for Soldering.

son that the soldered joint can not possess the strength of a weld; it should be used only where there will be no strain, and where but little strength is required.

The most important use for the soldering process then is to stop leaks in various articles. In automotive work, it is principally used for the purpose of making certain parts oil-tight. An excellent illustration of this is in cracked oil pans that are frequently made of aluminum. Here the important consideration is to make the pan oil-tight. If the crack is located in the bottom or sides of the pan, there will be little or no strain upon the joint, but if the fracture happens to be located in the flange or through bolt holes, it will not be perfectly safe to solder the job.

In the consideration of the fundamentals of the soldering process, whether it be

done with a welding torch or with soldering iron, let us take a specific example, such as is illustrated in the accompanying photographs. In either event the crack is first beveled out to an angle of at least 90 degrees; in other words, the crack is grooved its full length, and nearly its full depth. The groove is wide at the top and gradually slopes to the bottom; being, say twice as wide at the top as the metal thickness. The reader, who is familiar with the welding process, will see that this step of the soldering process is exactly like aluminum welding in one of its common forms.

The next step is also the same as for welding and should be done whether the soldering iron or the torch is used. It consists in cleaning the groove and the metal in its near vicinity. And is handily accomplished with a file, scraper, or emery cloth. The aluminum is scraped as clean and bright as a new dime and is then ready for the application of the solder. Fig. 1 indicates the condition of the work at this stage.

The next step of the soldering process is indicated in Fig. 2, where the solder is being applied with a common soldering copper. This method will be discussed first and the torch method taken up afterward, the differences between the two being pointed out so that either process may be employed at the discretion of the repairman who has both tools.

The soldering iron method is, in detail, as follows:

Heat the soldering iron very hot and rub one corner of it along the groove, back and forth until the groove becomes hot enough to keep the melted solder fluid. It is probably better to operate on a short portion of the groove at a time, for it can be kept hot easier. The bar of solder is brought in contact with the hot groove and soldering iron until enough of the bar is melted to fill that portion of the groove.

It is well to use two or more irons to avoid a loss of heat and consequent stoppage of the work to re-heat the iron: while one is being used, the other is heating. It will also be found an advantage to employ heavy irons as they will retain the heat longer.

Better still, perhaps, is the method illustrated in Fig. 2. Here the heat is being kept up on the groove by a natural gas burner, which is shown protruding from beneath the end of the oil pan. An even, steady heat is thus assured and the opera-



tor does not need to be so particular about keeping the soldering iron hot; he can devote more of his time to melting the solder. He must be very careful, however, not to get the oil pan too hot, as there

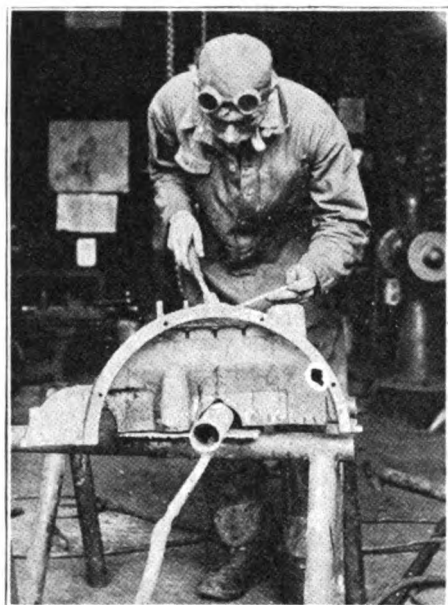


Fig. 2—Pan, Preheater and Application of Solder Using Soldering Iron.

is danger of it collapsing. There is also danger of cracking the pan unless the soldering is done with dispatch. After the repair is finished, he will likely have to cover that part of the cast to prevent contraction cracks, the same as he would in welding.

As fast as each portion of the groove is rubbed full of melted solder, the process is moved forward to another portion of the groove. In this way the joint is made continuous from end to end. It is good idea to pile surplus solder along the top of the filled groove. This may be neatly rounded over smooth with the heated soldering iron. While it is being done, the gas burner is turned out as then the heated part of the cast and the soldered joint may cool in unison.

The purpose of this soldering method is to cause an alloy, or composition of metals, to fuse and unite with the surface of the aluminum, when both are subjected to the proper heating. A solder recommended for this purpose may be made according to the following recipe:

|                    |        |
|--------------------|--------|
| Phosphor-tin ..... | 5 oz.  |
| Zinc .....         | 7 oz.  |
| Aluminum .....     | 6 oz.  |
| Tin .....          | 54 oz. |

Melt the zinc in a crucible placed in a hot fire, well banked around with coke. Watch the zinc and do not overheat it because it will turn to oxide very quickly. Oxidizing is detected by sulphurous looking smoke and flying particles of whitish substance.

Just as soon as the zinc settles to a liquid pool in the bottom of the pot, add

the tin and phosphor-tin in small bits as fast as they will melt into the zinc bath. When all is molten, add the aluminum. This also should be added gradually in small pieces, or it may be added by pushing the aluminum wire into the molten mass of metals as fast as it will melt.

Be sure the whole mass is in a flowing state before pouring. This condition is ascertained by rocking the crucible a little. If the surface of the metals moves freely and seems thin and milk-like, it is about ready to pour. If the melting and mixing has been properly done, there will be very little dross on the surface of the molten metal. Any dross that may exist should be skimmed off before testing and pouring the metal.

Aluminum solder should be poured into sticks or bars of small diameter, say not over half an inch. A makeshift metal mold may be devised for the purpose with pieces of angle iron placed level on the floor or bench and stopping each end to get the desired length of bar by placing a small portion of moist clay at proper intervals. Pour only enough of the solder into this trough to make the desired size bar.

Small bars are more easily handled and help to make a better joint because just the right amount may be melted from them with the soldering iron. A large bar will frequently supply too much solder and, therefore, clog the groove, producing opposite from the desired result—a poorly connected joint. The melting range of this solder is between 300 and 400 degra. Cent.

Other solder formulae may be obtained from most of the machinists' handbooks, or Circular No. 76 of the United States Bureau of Standards, which gives a list of aluminum solders.

No flux is used with any of these solders and the chief obstacle to their usage is the film of oxide which forms on the surface that is to be soldered. This surface should be well tinned with solder.

If the torch is to be used in soldering a job like that illustrated, it will not be necessary to employ the auxiliary heater. In fact, its use may prove a risky adventure with the soldering method if the mechanic happens to be inexperienced. However that may be, let us omit the preheater from the torch-soldering process on this job.

First the crack in the bottom of the pan is grooved and scraped along its edges as has already been described. Then a small torch fitted with a small size tip, is lighted and regulated neutral to make sure there is not too much oxygen present. The oxygen is gradually reduced until there is a slight excess of acetylene in the flame.

This excess acetylene flame is safer since there is little danger of oxidizing the metals, which would be the case if an excess of oxygen were present in the flame.

The excess acetylene flame furnishes plenty of heat to melt and apply the solder and is not brought close to the surface of the casting or solder.

This flame is played along the V-groove until it becomes fairly hot. Then a wire hand brush is used along the groove until it shines bright and clean; a vigorous rubbing with dry waste will sometimes have the same effect.

As soon as the brushing is finished and while the groove is yet fairly warm, one end of a bar of aluminum solder is rubbed along the groove until a small amount adheres to its sides and bottom. Next, the flame is played along the groove in conjunction with another vigorous rubbing or brushing.

This is done until every part of the groove surface is coated with a thin skin of solder. Then, if by this time the groove is not hot enough to melt the solder bar when it is rubbed along the surface, the flame is played along the coated groove until the heat is increased enough.

When hot enough to melt the solder, the groove is melted full and a slight surplus piled on top and rounded over. It is also possible to assist this melting with the flame, if the operator handles the torch deftly, the main idea being to make the solder adhere firmly to the surface



Fig. 3—The Crack Rounded Over With Aluminum Solder and Polished.

of the pan metal without melting the aluminum in the composition.

The operator may give the surplus solder a more pleasing appearance by pressing or patting it smooth with a flat  
(Concluded on page 62.)

# Motor Fuel Production, Distribution

Gasolene's Physical and Chemical Properties—Tests for Volatility or Distillation Range; Acidity; Unsaturation—Development of Substitutes—Published by Courtesy of Journal of Franklin Institute—Final Installment

By E. W. Dean, Ph. D.

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The most interesting phase of the subject of gasolene for a chemist is, of course, its physical and chemical properties. Discussion of these, however, is likely to lead to a great many details which are not of general interest and realizing this fact the author has attempted to avoid technical details as far as is consistent with giving a reasonably adequate idea of what gasolene actually is.

The various properties which are commonly studied may be listed as follows: Color, odor, "doctor" test for decomposable sulphur, bodies, corrosion and gum formation, gravity, unsaturation, acidity, and volatility or distillation range.

Of these properties it may be stated that color, odor, the "doctor" test and the corrosion and gumming test are not of sufficient interest and practical importance to warrant discussion in the present paper. The gravity test is one which has been highly regarded in the past but which actually is of minor significance. The present paper undertakes to show why it is of slight use in determining the quality of gasolene.

The unsaturation test is of interest because it shows whether or not a gasolene contains products of the cracking reaction. The acidity test is one which covers care in refining and which has been included in government specifications, although its practical value has not as yet been definitely determined. The most important property of gasolene is its volatility, which is indicated by determination of its distillation range.

The behavior of gasolene in an internal combustion engine is very largely determined by this property of volatility, which is the basic one on which gasolenes are graded by intelligent refiners. The older system of grading on the basis of gravity still holds to a limited extent but even this is based on the assumption that distillation range is a function of gravity, which assumption is correct only when considerably qualified.

The method for determining volatility in-

volves an analytical distillation under regulated conditions. These conditions and the nature of the apparatus used have a considerable influence over results and it is, therefore, necessary that tests be made in the same way if figures are to be regarded as comparable. Testing methods were in the past subject to considerable discrepancy, but since the recent recommendation of a certain method by the Bureau there has been a marked improvement in this par-

cent marks is reached, and when the dry point is reached, the latter being taken as the highest temperature obtainable shortly after the flask has apparently boiled dry at the end of the distillation.

Of these various readings, the following are usually sufficient to define the distillation range of gasolene: First drop temperature, 20 per cent, 50 per cent, 90 per cent marks and the dry point. These are the points usually employed in the specifications.

In discussing the properties of gasolene a figure is sometimes employed which is called the average boiling point. This has not been employed in specifications as yet, but is of some value in providing a single figure to be used as an index in stating the volatility of gasolene. This figure is obtained by adding the first drop temperature, each of the 10 per cent marks, and the dry point, and dividing by 11. This figure provides the same sort of information that would be obtained by means of a gravity test if the gravity test indicated what it is supposed by many to do.

## Distillation Range.

Three methods of producing gasolene have been discussed, namely, the straight refinery method, the casing-head gas method, and the cracking method. Gasolene produced by the cracking process has no characteristic properties as regards distillation range. It is, however, frequently pos-

sible to distinguish gasolene blended with casing-head products from the straight refinery types.

Fig. 6 shows an interesting series of curves. One of the samples represented is a product made by blending casing-head gasolene with kerosene. Its distillation range is distinct from that of any of the other samples. This type of fuel is not regarded as entirely satisfactory. It may be noted, however, that neither the gravity test nor the average volatility figures would distinguish this gasolene from one of the more desirable types.

The second sample of the series represented in Fig. 6 is one composed of casing-

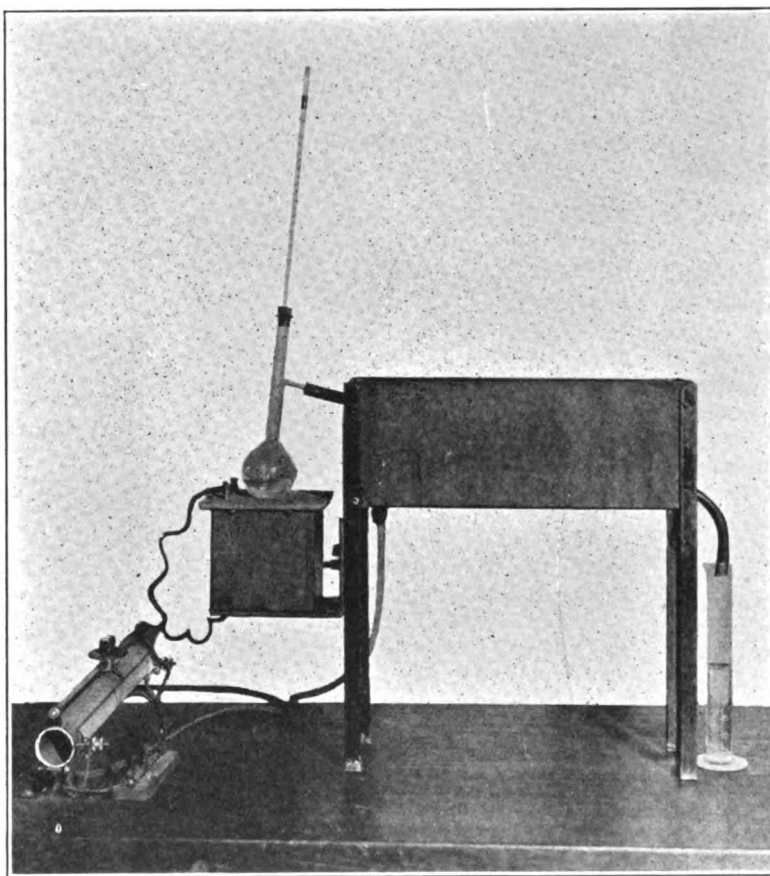


Fig. 5—Apparatus for the Analytical Distillation of Gasolene.

ticular. Practically all specifications are now based on a distillation by the method recommended by the Bureau of Mines, which has been described in various publications.

## Volatility or Distillation Range.

The apparatus used in the test is represented in Fig. 5 and consists essentially of a source of heat, a 100 c. c. distillation flask of specified dimensions, an ice-cooled condenser of specified dimensions, and a 100 c. c. graduate. The method involves heating the gasolene at a specified rate and reading temperatures when the first drop falls from the end of the condenser, when each of the respective 10 per

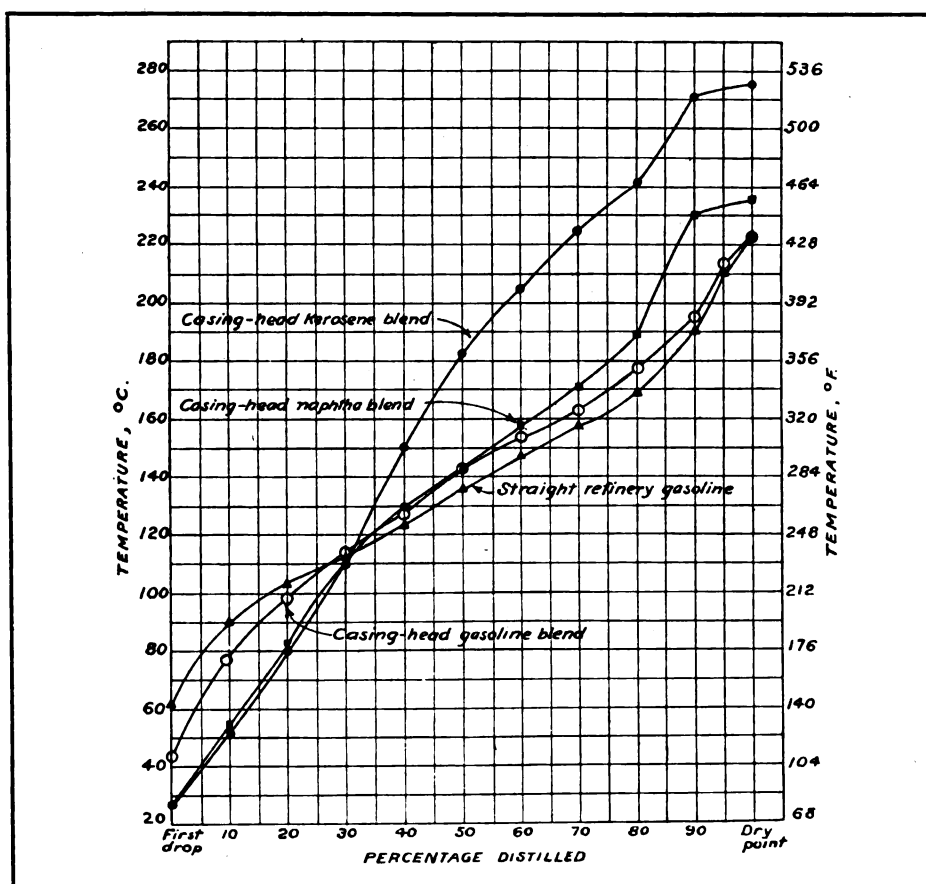


Fig. 6—Distillation Curves of Three Types of Blended Casing-Head Gasolene and Straight Refinery Gasolene.

head gasolene, blended with so-called heavy or high-boiling naphtha. This type of product is notably superior to the kerosene blend but is not entirely ideal as motor fuel, although gasolene of this type is used in large amounts and with reasonable satisfaction. It is believed, however, that the preferable type of casing-head blend is that represented by the third curve which shows the distillation range of a sample made by blending a very moderate quantity of casing-head gasolene with straight refinery gasolene. The curves for the three casing-head blends are shown in comparison with the curve for a straight refinery gasolene. It will be observed that the casing-head blends have curves which for the first 20 or 30 per cent are lower than the straight refinery product. Above this point the curves are higher than the curve for the straight refinery gasolene by varying amounts.

In the spring of 1919 and in the spring of 1917, the Bureau of Mines made surveys of the quality of gasolene sold throughout the United States. Certain of the results of these surveys are of general interest and are briefly discussed. In the first place, it was observed in the course of both surveys that the general quality of gasolene varied to a certain degree in various sections of the country.

The states on the Pacific coast received gasolene of relatively low-boiling range (or high volatility). The states on the Eastern coast were next as regards law-

boiling range of gasolene. The Middle Western states received gasolene which was less volatile than that marketed on

the Eastern coast, while the Rocky Mountain district received the least volatile grade of gasolene of any part of the country.

The boiling range of gasolene has, during the past five or ten years, been increasing notably. In the days when gasolene was a by-product of the refinery industry, incident to the production of kerosene or lamp oil, its end point was in the general neighborhood of 400 degrees F. As the demand for gasolene increased, this end point has gradually raised. When the Bureau first began a study of the properties of gasolene, the figures usually maintained were between the limits of 350 degrees F. and 400 degrees F. The end point has continued to increase so that in 1919 the average was about 425 degrees F.

As regards the change in quality between 1917 and 1919, the samples collected in each of the respective surveys show that the first drop and 20 per cent temperatures are practically the same in both cases but that there is a difference beyond this point, the difference at the 90 per cent marks and dry points being between 15 degrees C. and 16 degrees C. This means that the gasolene marketed in 1919 was practically equal to that of 1917 as regards starting qualities but that the properties controlled by the end point had changed somewhat.

Improvements in engine design have undoubtedly made up for a considerable proportion of this difference and the gasolene marketed at present is probably used with fully as great satisfaction as that marketed in 1917. There is some question as to how

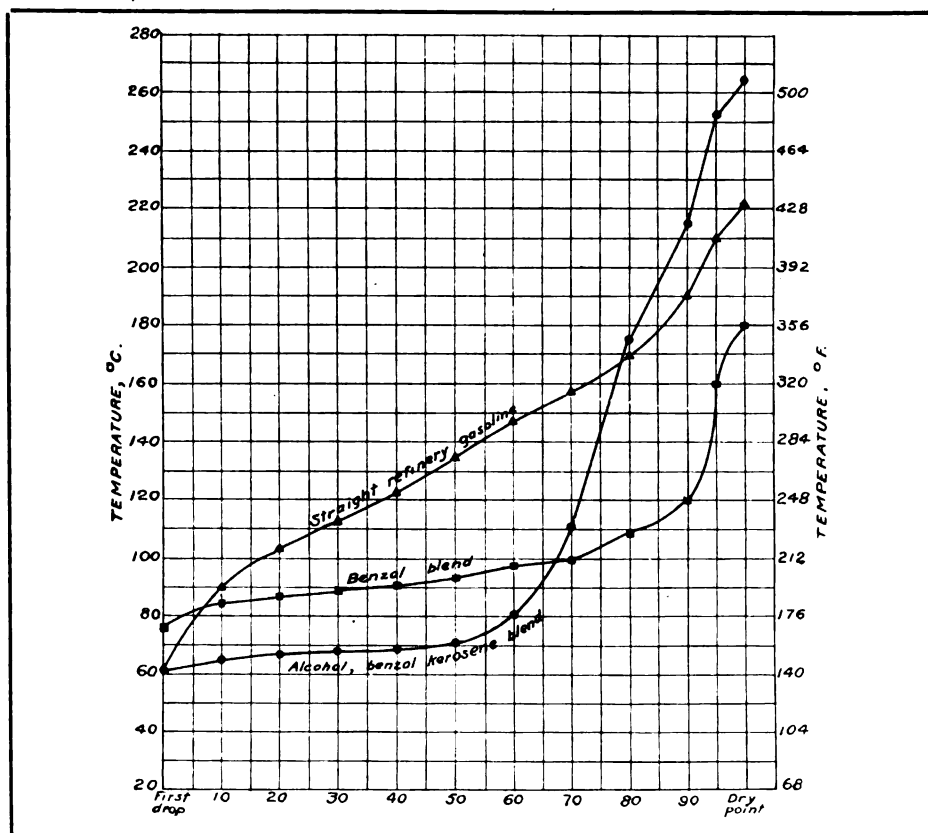


Fig. 7—Distillation Curves of Three Different Types of Motor Fuels.





were able to distinguish cracked gasoline, it would very likely be on account of its advantageous rather than its disadvantageous behavior.

#### Gravity.

Up to the last few years it was customary to rate gasoline on the basis of its Baumé gravity, and even today users are inclined to believe that a high Baumé gravity, which means a low specific gravity, is a desirable property. The gravity test under certain conditions does give indication of the distillation range of gasoline but in general furnishes highly unreliable information in this particular.

It has already been pointed out that a mixture of kerosene and casing-head gasoline might have the same gravity as a straight run gasoline. In addition it may be stated that the types of crude oil produced in different parts of the country have different physical and chemical properties and that for a given gravity there may be considerable difference in boiling range or vice versa.

#### Gasolene Substitutes.

The subject of gasoline substitutes is one of particular interest, although definite information concerning it is decidedly limited. The first fact of importance to be recognized is that motor fuel is essentially a source of energy and that the energy must come from somewhere.

Wonderful statements regarding the discovery of new fuels appear periodically in the newspapers, these fuels generally being made by adding a small quantity of some secret compound to water. That these discoveries are one and all without particular value is proven by the fact that water is a substance which contains about as little free energy as anything one could select.

As regards the real possibilities of gasoline substitutes, it now seems probable that oil shale may in the future prove an important source. There are enormous deposits of oil shales in the United States and the extraction of liquid oil from these is undoubtedly feasible, although it has not yet been worked out on a commercial scale in this country.

Oil shale probably will not assume any considerable importance as a source of motor fuel in the near future, but its potentiality as a resource gives a comfortable sense of assurance that the use of motor vehicles will not have to be discontinued when petroleum resources are exhausted.

Another type of fuel which offers unlimited possibilities for the future and which is already being developed to a certain degree is alcohol. The problems to be solved before this comes into general use are apparently the development of cheaper methods of production and the development of suitable types of engines.

Efforts are at present being made to market a fuel containing alcohol and other components which may be used satisfac-

torily in present types of automotive engines. A sample of this fuel has been obtained by the Bureau in the retail market and has been subjected to laboratory examination. The distillation curve of this sample is shown in Fig. 7.

Its exact chemical composition was not determined but it was shown to contain both alcohol and benzol as well as a fair percentage of a product that might be classified either as a low-boiling kerosene or a high-boiling petroleum naphtha. The sample obtained by the Bureau was being sold at a price somewhat higher than that of motor gasoline. As regards its use, the Bureau has received reports from at least two reputable organizations, indicating that it was found at least as satisfactory as ordinary gasoline.

The type of gasoline substitute of most importance at the present time, is the mixture of hydrocarbons obtained as a by-product in the coking of coal. These so-called coal tar distillates, including benzol, toluol, xylol, etc., are hydrocarbons which are somewhat similar to the hydrocarbons found in petroleum, although, of course, there are well-recognized physical and chemical differences.

During the war, coal tar distillates were largely used in the production of explosives and other munitions but since the termination of hostilities a considerable supply has been rendered available for motor fuel. Several companies have already undertaken to market benzol mixtures and in the course of its 1919 survey, the Bureau secured a number of samples which were sold as gasoline substitutes containing benzol.

The distillation curve of one of the samples is shown in Fig. 7 and of some of the other samples in Fig. 8. The products are generally mixtures of coal tar distillates with petroleum naphtha. These products have been used under widely varying conditions and in some cases favorable results have been obtained, in others unfavorable results. Inquiries made by the Bureau have usually been answered by statements either that the substitutes were very satisfactory or very unsatisfactory, few of the users seeming to have found them about the same as petroleum gasoline.

The use of coal tar distillates as motor fuel does not, however, offer an ultimate solution of the motor fuel problem as the total production of these hydrocarbons is rather limited. In discussing this subject in a paper prepared about two years ago the author had occasion to collect some statistics which are represented graphically in Fig. 9. This figure shows:

1. The nation's gasoline production in 1916.
2. An estimate of the total light oil production if all the bituminous coal mined in the country were coked in by-product ovens.

3. An estimate of the production of light oil, if all coking ovens were of the by-product type.

4. An estimate of the actual light oil production for the year 1917.

The actual figure for hydrocarbons suitable for motor fuel is even less than that for total light oil produced, and it appears, therefore, that as a motor fuel resource, coal tar distillates are of relatively small importance. It may, for instance, be stated that since 1916 the production of gasoline has practically doubled while the quantity of coal mined has increased only about 17 per cent.

The real importance of coal tar distillates as motor fuel occurs in districts adjacent to by-product coking operations where a reasonable proportion of the local gasoline supply may be filled by coal tar products.

Benzol and other coal tar distillates have certain disadvantages when compared with petroleum gasoline but have other very marked advantages; particularly in freedom from tendency to knock.

An additional advantage lies in the fact that they have a considerably higher calorific value per unit volume, and as this is the basis on which the user buys, he gets more for his money than he would from petroleum gasoline. It is believed that coal tar distillates, if properly used, are very satisfactory motor fuels and that there should be little difficulty in finding a market for the entire supply.

The Bureau's general feeling with regard to substitutes for gasoline is that they should receive all possible encouragement if produced and marketed in an intelligent and scientific manner. The nation certainly needs to increase its motor fuel resources and no step in this direction should be hindered. It should be recognized, however, that petroleum gasoline is a type of fuel for which present equipment has been designed and for which it is eminently satisfactory.

It is believed, therefore, that when striking claims are made for the superiority of any gasoline substitute, these should not be taken too seriously. The substitute fuel should be given a fair trial but the user should be satisfied if it is as good as gasoline and should not expect it to be notably superior.

#### Storage Batteries Explained by Moving Picture Films.

The mysteries and uncertainties of storage batteries used in automobiles for starting, lighting, and ignition are explained by a moving picture film which will be shown at Detroit moving picture theaters soon. This film shows the construction and functioning of an electric storage battery under normal use and while being abused.

There are 3,000 feet of the film and the functioning of the battery is pictured by sketches which required one man 17 days to complete one foot.

# Practical Hints for Shop Mechanics

## Finding Misfiring Cylinder.

One day a car was brought into our shop with one of the cylinders continually misfiring at low speeds. If the engine was speeded up, the cylinder in question would work properly. It puzzled us for some time until finally I had a small can made for gasoline and attached to it a rubber hose on the end of which I used a piece of copper tubing shaped into a nozzle for spraying purposes.

No sooner had I sprayed gasoline around the shoulder against which the valve spring bears than the cylinder began to fire. Upon close examination I found a small blow hole, the sand from which in all probability worked out by the vibration of the engine.—A. L. M., Mass.

\* \* \*

## Grease Gun Repair.

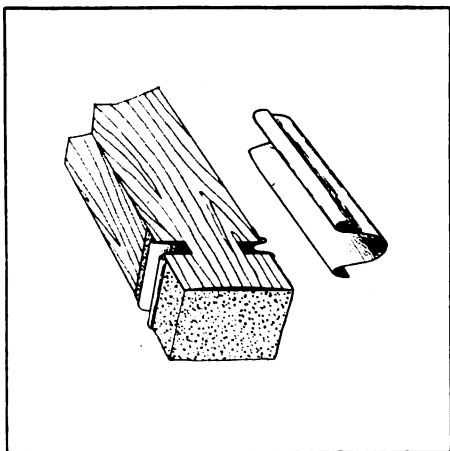
Sometimes the threads on the cap of a grease gun become so worn that the gun jumps the threads. If this occurs, take out the plunger and unscrew the cap. Next, solder a nut of the same size and thread as the screw on the inside of the cap. This will obviate the former trouble, as the new threads will hold the cap firmly in place.—A. E., Ill.

\* \* \*

## Polishing Armatures.

The polishing of armatures very often presents certain obstructions which make the work more trying and difficult especially when the generator is in an awkward position and hard to reach.

A very handy tool for polishing armatures is a piece of wood about 1 in. by 1½



Tool for Polishing Armatures.

ins. and 10 ins. long, covered with sandpaper, which is wedged at the sides as shown in the illustration.

The wedges allow a quick removal of the sandpaper when it becomes worn and

## ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

does away with the trouble of continually hunting for tacks to fasten the paper, when that method is used.—P. W., N. Y.

\* \* \*

## Oil Leaks Around Crankshaft.

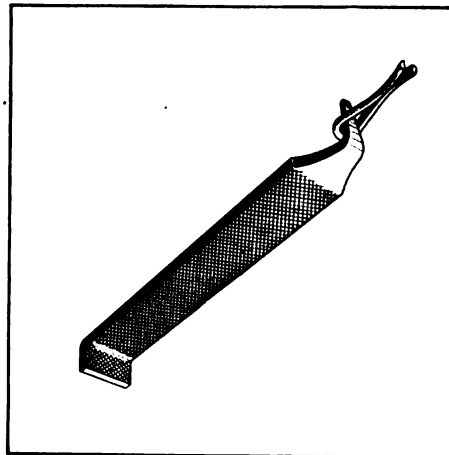
Very often considerable trouble is experienced in trying to stop an oil leak around the crankshaft between the last bearing and the flywheel.

A very good way to stop such an oil leak is to wrap a strip of felt around the shaft and hold it in place by a coil spring.—C. E., Ind.

\* \* \*

## Cotter Pin Puller.

One of the most annoying, as well as frequent, duties that a mechanic is called upon to perform is the removal of many



Handy Cotter Pin Puller.

cotter pins even on a minor job. A very good idea is to include in the kit a tool for removing these pins easily and rapidly.

This tool can be made from an old file, the handle end of which should be drawn

to a fine point and bent at right angles, as illustrated, bending also the other end to the same angle in order that when occasion demands it may be struck with a hammer to aid in withdrawing the pin.—C. G., Ill.

\* \* \*

## Lubricant for Springs.

In lubricating automobile springs the greatest trouble is found in keeping the lubricant from being squeezed out under pressure. A compound that obviates this is found in graphite and beeswax mixed to a paste and spread upon each leaf. To apply the lubricant the spring must be taken apart.—T. J., N. Y.

\* \* \*

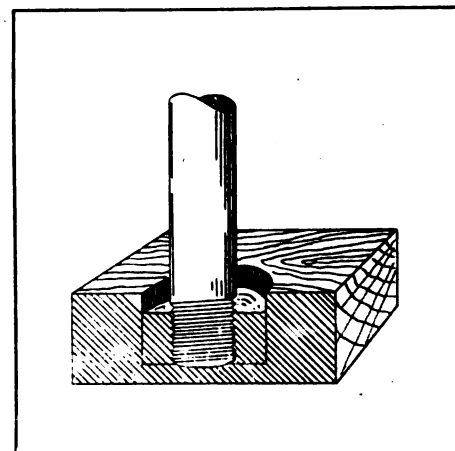
## Way to Insert Screw.

It is often difficult to start by hand the small screws such as those used in the magneto, speedometer, etc. An easy way out of this difficulty is to hold the screws between the legs of a pair of calipers, a drawing compass or even in the slot of an ordinary steel pen. The screw can then be driven home by a small screw driver. The same method may be used in replacing small nuts located inaccessibly.—T. J., N. Y.

\* \* \*

## Templet for Thread Size.

The following kink may be of value to readers of the American Garage & Auto Dealer. I recently broke the idle gear shaft and as they were special threads, it was necessary to chase them in a lathe. The question arose as to how we would know when they were "chased" to the proper depth. This was solved by boring a hole

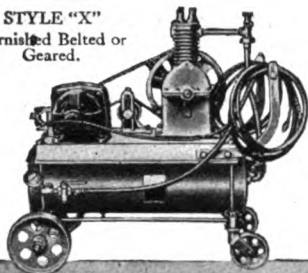


Determination of Depth Thread.

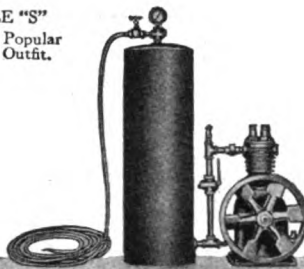
in a wood block to the depth of the threaded portion of the shaft.

The threaded portion of the shaft was then set in the hole in the block and melted babbitt poured around it, as shown in the

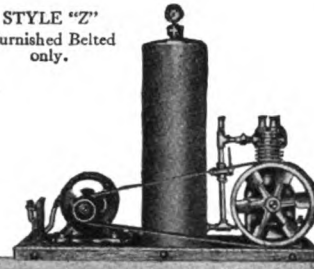
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illustration. When it had cooled, the shaft was backed out, leaving a templet of the thread in the metal. New threads, cut to fit this templet, fit perfectly in the nut.—C. B. H., N. Y.

\* \* \*

### Spark-Plug Cleaner.

It is comparatively easy to make an effective spark-plug cleaner as follows: Get a piece of glass tubing about three inches long. In each end place a cork and bore each cork to take the threaded bushing of a spark-plug.

Fill the tube with sand and gasoline, insert the spark-plug; and shake the device briskly. The sand and gasoline will clean out the carbon in a short time.—L. T., Cal.

\* \* \*

### Driving Out Bolts.

Bolts are very often spoiled in driving them out from the parts in which they are retained. If they do not start readily, the temptation is to use a hammer on them with the result that the ends of the threads are frequently damaged.

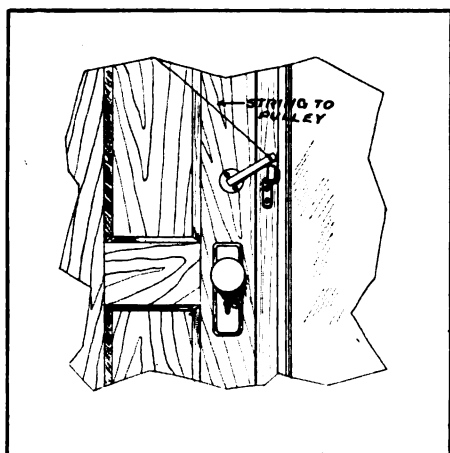
A stick of hard wood, or, still better, vulcanized fiber, used between the hammer and the bolt end, will prevent damage of this kind. When neither is available, the nut may in some cases be run flush with the end of the bolt or even a little beyond it and a blow, carefully placed upon it so as not to hurt the threads, will probably start the bolt.—D. P., Mich.

\* \* \*

### Inside Latch Spring.

A common desire among garage and workshop owners is to allow only desirables to enter the work shop. It is more or less of a problem to arrange for locking out such people and still permit desirables to enter.

The illustration will show how this can



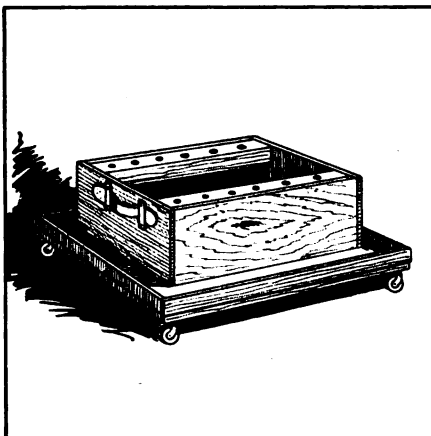
Operation of Inside Latch Spring.

be accomplished by connecting a string, from an arm on the knob, to a point convenient to the stockroom clerk, boy, or some one else who is always in sight of the door, and who can by pulling the string unlock the door when a privileged person wishes to enter.—C. L. S., Ill.

### Handy Tool Box.

The accompanying sketch shows a tool-box on casters which we have found to be a very handy device around our shop, especially for small jobs where the mechanic is changing from one machine to another several times per day.

The box can be made in any size to suit



Movable Tool Box for Small Jobs.

requirements. In fact, we have found the one shown very convenient. The bottom of this box is 20 ins. by 26 ins. and the top, 14 ins. by 20 ins. by 6 ins. deep.

The bottom frame is made of one-inch square strips and covered with 1/2-inch box-lumber. The top box is made of 1/2-inch box-lumber. On each side of the box is fastened a 2-inch, or smaller, square piece of soft wood bored to carry pressed steel sockets, and small tools such as punches, cold chisels, screw drivers, etc.

A strip of leather on each end will hold a ratchet handle and extension bar. A piece of lath nailed to the edge of the bottom and extending about 1/2-inch makes a good recess for tools, when one is working on a creeper. A set of ordinary small plate casters completes the job.—E. L. S., Ohio.

\* \* \*

### Hoist Tongs.

A very convenient and easily made device for lifting heavy articles in a workshop, such as truck wheels, motors, gear-sets, etc., can be constructed from strong pieces of metal put together like a pair of ice tongs, and used in connection with a chain hoist.—S. H., Ill.

\* \* \*

### Portable Meter Carriage.

In a shop where there are any number of batteries to be charged the operator should take precaution in handling the meter, which is easily injured from moving about. A simple arrangement whereby the meter can be moved from one battery to another without handling, can be made by arranging the batteries along each side of a work table, and over the top of this table and along the center build a light framework about six or eight inches higher than the batteries.

On this framework install two tracks on which can be mounted a small carriage on wheels to carry the meter. In this way it can be moved from one end of the table to the other, over the various batteries to be tested, as may be required, thereby eliminating the necessity of handling the meter.—L. S., Ohio.

\* \* \*

### Blowtorch for Soldering.

An ordinary blowtorch equipped with a burner and tipped with copper can be used very nicely for soldering. The point is easily maintained at the proper heat.

The end of the burner should be threaded on the outside and a hole drilled in the copper tip and correspondingly threaded. Small holes are drilled in the copper for the flame to come through.—L. A., Cal.

\* \* \*

### Picking Up Bolts and Washers.

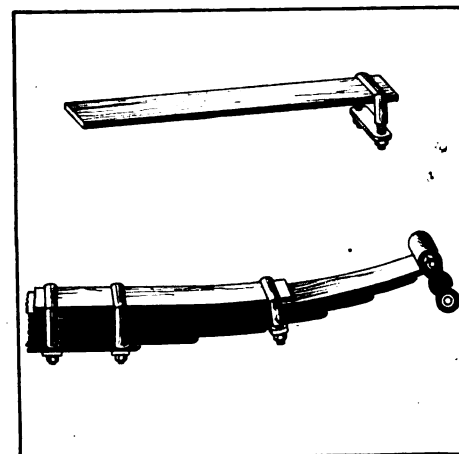
The small boxes containing bolts, washers, nuts, cotter pins, etc., often become mixed with trash, mud and rust. A very handy way to get rid of the undesirable material is to dump the boxes out on the floor or bench, and then pick up the contents with a large magnet such as is usually to be found around the shop.

In this manner, the trash is left behind and a long job is made short. If a small magnet such as is found in an old telephone receiver is kept in a handy place with a piece of wire about 18 inches long fastened to it, it will be useful in recovering nuts and small parts dropped in the crank-case or mud pan. It will go where the hand cannot.—R. W. T., Mo.

\* \* \*

### Temporary Spring Repair.

A broken spring can easily be patched until such a time as permanent repair can be made, by a device as shown in the illustration. This convenient device con-



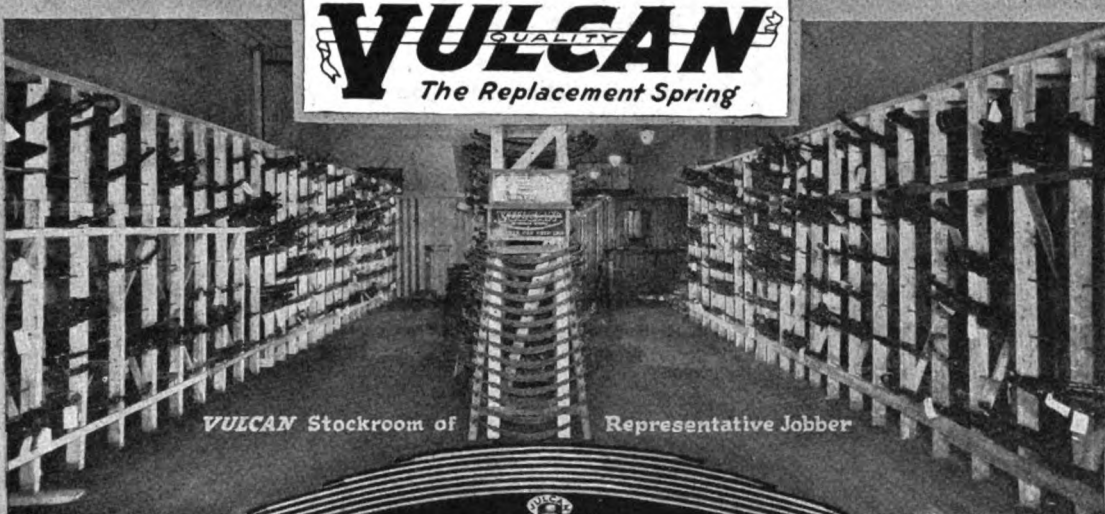
Method of Temporarily Repairing Spring.

sists of a bar of steel with a spring clip riveted to one end. The other end is slipped under the spring clips, which must be loosened for this purpose, and the set screw in the clip at the other end screwed fast. This locks the broken leaves securely in place.—G. S., Ill.



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# Readers' Questions and Answers

Conducted by E. C. Pohlmann

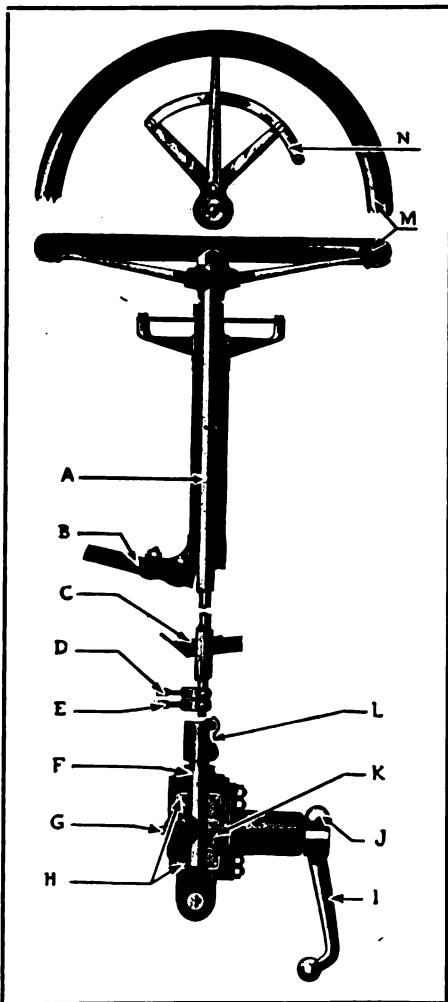
## Steering Gear Adjustment.

Please explain how to adjust the steering gear on the Maxwell car? What does this car weigh and what are the gear ratios?—P. C., Va.

When asking any questions concerning a specific automobile, always give the model number or specify number of cylinders and year. In this case, we presume you refer to the Maxwell 25.

If an excessive amount of end play, or lost motion in steering is noticed, remove the two upper clamp bolts in the steering gear shaft coupling, *L*, as shown in the accompanying illustration, and pull the steering wheel, *M*, and shaft *A*, up.

Unscrew the steering arm clamp nut, *J*, and remove the steering arm, *I*, from the worm-wheel shaft. Loosen the steering-gear, worm-adjusting-plug, clamp screw, and while turning steering gear with hand on coupling, one quarter-turn to right and then to left, tighten plug, *F*, until it begins to bind; then loosen just enough so the steering gear turns freely and tighten clamp screw. Replace the steering arm and shaft.



Steering Gear of Maxwell 25.

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

If there is still lost motion in steering, remove the steering arm, turn the steering wheel until the steering arm shaft has traveled one-quarter turn and replace steering arm. This gives the worm and gear a new bearing surface and can be done four times when needed, or until all parts of the steering gear have been used.

The Maxwell 25-4 weighs 1,650 pounds and the gear ratios are: Low, 10.48 to 1; second, 6.21 to 1; third, 3.58 to 1.

\* \* \*

## Adjusting Elgin Clutch.

Please publish in your next issue the gear ratios of the Elgin Six. How do you adjust the clutch on this car? What is the horsepower rating?—A. J., R. I.

The gear ratios of the Elgin Six are: First speed, 14 to 1; second speed, 8 to 1; third or high speed,  $4\frac{1}{2}$  to 1; reverse speed, 18 to 1. These gear ratios are approximate.

To adjust the clutch, release it by blocking the foot pedal with a piece of wood. Loosen both slot-bolts *A* shown in the accompanying illustration, and shift either of them clockwise about one inch. Let the clutch in and if the opening at *B*, is less than two inches, release clutch and tap slot-bolt in opposite direction far enough to open space at *B*, to full two inches.

The adjustment, *A*, also adjusts the foot pedal. When adjusting clutch see that at least  $\frac{1}{2}$ -inch clearance is left between pedal and footboard for wear-in. If after adjusting, the clutch slips, it is due to the clutch pedal striking against the under side of footboard.

When bolts *A* reach last end of cover slots, due to repeated adjustments, screw them out of their mounting and insert in holes exposed near first end of slots.

The S. A. E. horsepower rating is 21.6.

\* \* \*

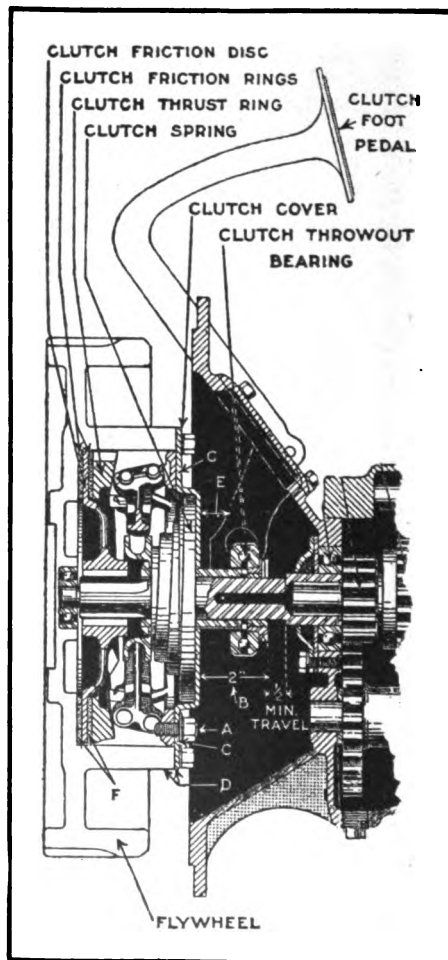
## Manufacture of Storage Batteries.

I would like to purchase a book that gives the manufacture of storage batteries in detail. Can you furnish this book or the address where I can purchase it?—C. H. K., Ohio.

There is no book published that we know of on the manufacture of storage batteries.

A very good theoretical book on storage batteries is "Storage Battery Engineering," by Lamar Lyndon, price \$4, published by the McGraw-Hill Book Co., Inc., 239 West 39th St., New York City. This book is considered a standard treatise and guide by the storage battery industry. The table of contents which follows will give you a fair idea whether or not this book will meet your needs.

Part I.—Electrolytic dissociation and the



Cross Section of Elgin Clutch.

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voltaic couple. Description and characteristics of the lead cell. Chemical theory of the lead cell. Thermodynamic theory of the lead cell. The quantity and distribution of active material. The electrolyte. Electromotive force and its variation. Capacity internal resistance. Internal discharge. The influence of temperature efficiency. Types of Planté plates. Methods of Planté formation. Pasted electrodes. Applied active material mixtures. Separators and envelopes. Containing cells. Testing. Assembling and installing. Durability and causes of deterioration. Diseases; their remedies. Care and management.

Part II.—Uses of batteries. Pilot cell accessories. End cells. Control by counter cells and resistances. End cell switches. End cell conductors. Boosters. Manually - controlled boosters. Self-excited, automatic boosters. Separately-excited boosters. Externally - controlled boosters. Current supply for booster motors. Design and selection of boosters. Compounding booster-controlled power plants. Adjusters of general output. Rheostats. Circuit breakers and instruments. Computation of battery capacity. Direct current systems. Line batteries. Plant efficiency. Exciter battery. Installations. Alternating-current system. Alternating-current controlled field regulators. Current converter systems.

### Speedometer Drive.

I have experienced considerable trouble in fixing the wire-drive belt on the speedometer of a Jordan-60 so that it would not detach and jump out of the grooves. Any advice will be appreciated. —J. S., Mo.

First of all determine whether pulleys S and P, as shown in the accompanying illustration, are properly aligned. This can be done by placing a straight edge on the side of the two pulleys to ascertain if it touches at four points. If not in alignment, position of pulley P should be changed. This can be made by altering the distance of the bracket from the transmission to which it is attached. If the pulley, P, does not run true or wobbles, the belt will jump out of the groove, and therefore it is best to replace the pulley with a new one.

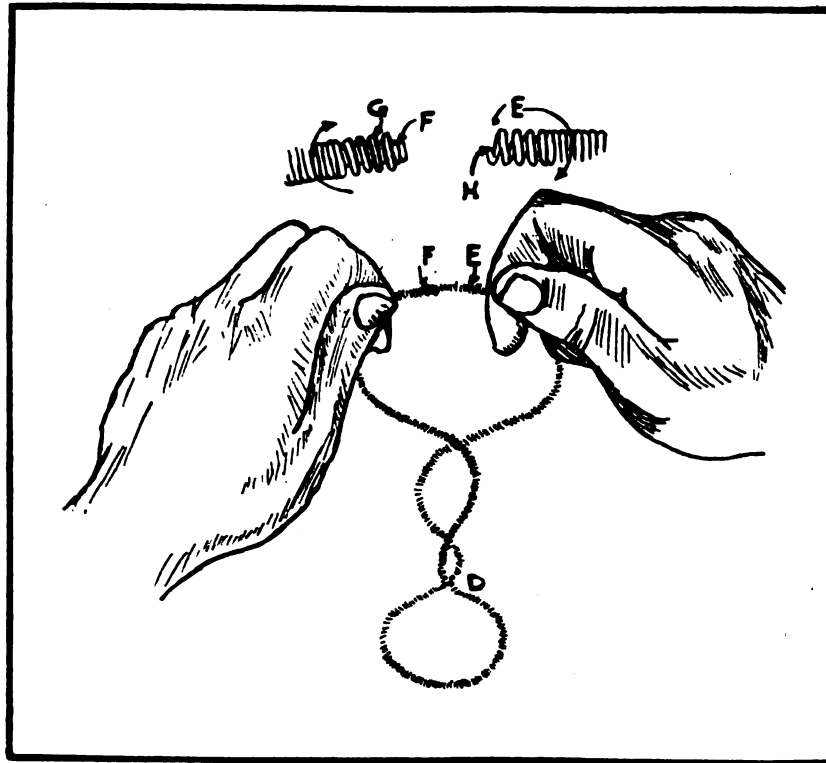
To attach the wire belt, grasp it with two hands, as shown in the accompanying illustration; hold end F, firmly; reverse

(unscrew) end E, at least six turns, until belt "kinks." Insert end F, in end E, and screw firmly together. The belt will then immediately resume its shape without a kink. Be careful not to damage wire by crushing or bending.

\* \* \*

### Engine Temperatures.

I would like to know what the temperatures are of the various parts of an automobile engine?—P. C., N. H.



Method of Fastening Wire Belt for Jordan Speedometer Drive.

The temperatures of the various parts of an automobile engine are approximately as follows:

Maximum temperature at top of explosion stroke, 2,500° to 3,000° F. The center of piston head, 700° to 800° F.; the cylinder walls, unjacketed, 400° F., jacketed, 180° to 200° F.; center of exhaust valve, 750° F.; center of inlet valve, 500° F.; circulating water, 140° to 150° F.; crankshaft bearings, 125° to 150° F.

\* \* \*

### Pressures in Gas Engine.

1. What is the average pressure per square inch of the explosion on the power stroke in the gas engine.

2. What is the average compression per square inch used in the gas engine.

I am well pleased with your magazine. —F. L., Mich.

1. We do not know what you mean when you refer to the average pressure per square inch of the explosion on the power stroke.

As we understand your question you mean the explosion pressure of the average gasoline engine. This averages from 250 to 300 pounds per sq. in. It usually amounts to from three to five times

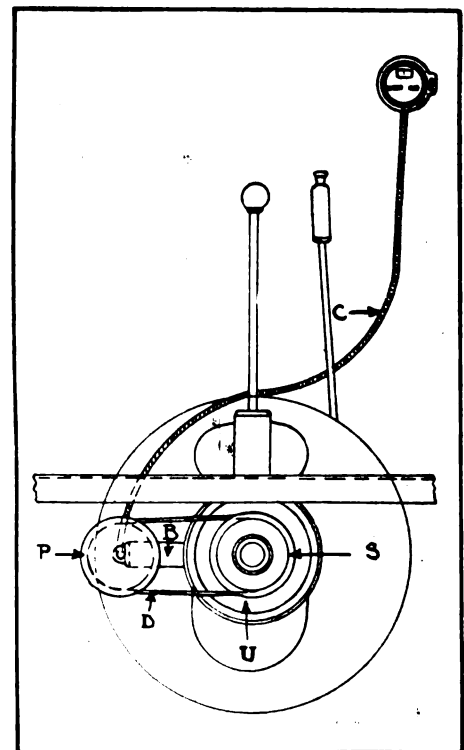
the compression pressure, depending on the point of ignition and the mixture.

If by the average pressure of the explosion on the power stroke you mean the mean effective pressure, this amounts to from 70 to 85 pounds per sq. in. By mean effective pressure here is meant the pressure which would act on the head of the piston if it were distributed evenly throughout the stroke, instead of suddenly at the beginning of the stroke and then gradually decreasing during the expansion of the charge.

2. Here again, by average compression we suppose that you mean compression which is used in the average gasoline engine. This pressure averages from 60 to 65 lbs. per sq. in.

When referring to the gasoline engine in these explanations, we refer to the gasoline engine as utilized in the automobile. Strictly speaking, gas engine means an internal-combustion engine which utilizes natural gas, producer gas or blast-furnace gas. For stationary gasoline and kerosene engines these compression and explosion pressures are different.

The following are the usual compression pressures used in the various engines as

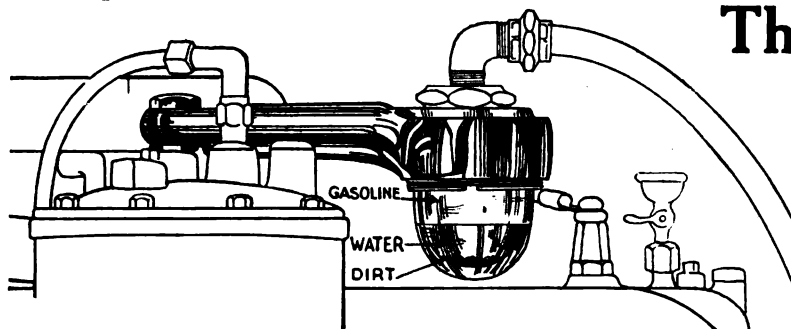


Driving Mechanism of Speedometer.



# Stop that Dirt at the Right Place

The place to stop the water and dirt which are now found in gasoline is **before** it reaches your carburetor. Once there it causes trouble—checked needle valve, fitful flow of gas, misfiring, carbon on your spark-plugs, sticky grease on your valves—delay, humiliation and expense.



## The Steward Visible Gasolene Purifier

removes the impurities from gasoline. Connected between the intake pipe and vacuum tank or carburetor, the glass trap catches and holds the dirt, water or other impurities. Easy to clean. Just unscrew the glass cup, wipe it clean and return it to its usual place.

### FITS ALL CARS

With an ordinary wrench you can attach the Steward Visible Gasolene Purifier to any car in a few minutes. **Price \$7.50.**

**JOBBERs, DEALERs**—This is proving a big seller, strongly supported by advertising. Write the nearest distributing agent for our proposition.

#### DISTRIBUTING AGENTS

HARRY I. DORN CO., 299 Broadway, New York City  
JOSEPH WOODWELL CO., 201 Wood Street, Pittsburgh, Pa.

BARNUM A. LEVITAN, 3044 14th Street, Washington, D. C.  
THE THOMAS-BRAY CO., Provident Bank Bldg., Cincinnati, O.  
W. J. BURDICK, Los Angeles, Cal.

## WARNING— FORD OWNERS! SAVE YOUR BEARINGS!

Repairmen say that burned-out bearings are the greatest item of expense in the upkeep of a Ford. The trouble has been that the driver had no way of knowing whether he had lubrication or not. You can now absolutely **know** that your Ford is always properly lubricated, by simply installing the

## MOORE Dash Sight Feed Oil System (for Fords)

**THE MOST NEEDED, MOST VALUABLE  
FORD ACCESSORY EVER INVENTED**

Right before your eyes on the instrument board or dash a stream of oil constantly circulating through a handsome gauge, then through a strainer, lubricating every part, preventing burned-out bearings, connecting rods, scored cylinders, and lengthening the life of the engine.

When the oil is near the danger level it stops flowing through the gauge—thus giving warning to replenish your oil supply within the next 20 miles.

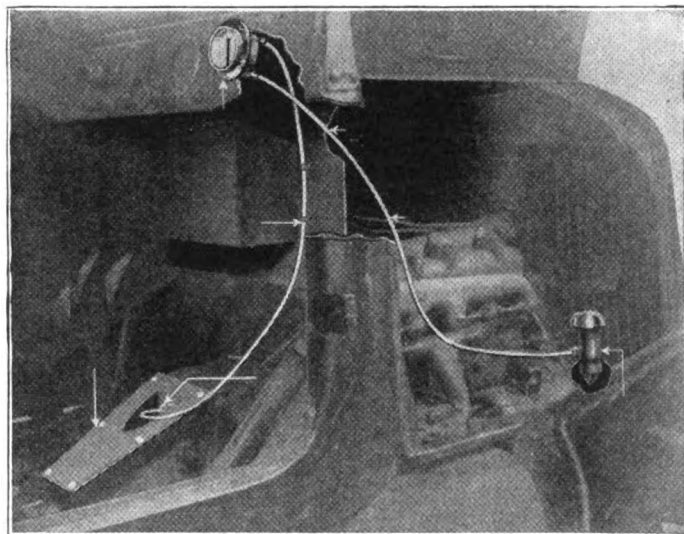
It is a positive force-feed system, independent of the regular Ford system, gives lubrication on the steepest hill a Ford can climb, and regardless of whether the regular Ford system is clogged. Operates at all motor speeds.

**JOBBERs DEALERs**—Write nearest distributing agent or factory for proposition.

#### DISTRIBUTING AGENTS

HARRY I. DORN CO., 299 Broadway, New York City  
UNITED STATES PRODUCTS CO., Highland Bldg., Pittsburgh, Pa.

BARNUM A. LEVITAN, 3044 14th Street, Washington, D. C.  
W. J. BURDICK, Los Angeles, Cal.



It gives Ford owners what all other motor car manufacturers consider an absolute necessity—a convenient means of knowing that the oil is circulating and when more oil is needed.

You may be as regular in giving your Ford oil as in winding your watch, but—oil cocks become loose and drop off or the crank case oil tube becomes clogged, stopping the oil circulation and causing you heavy repair costs. Furthermore, it is surely a bother and a wear and tear on temper and clothing to "get out and get under" and turn those hard-to-reach oil cocks.

Any one of these several things accomplished by the Moore dash sight feed oil system will make a saving of more than the purchase price.

**Price \$10.00.** Write for circular and full details.

**Automotive Material Co., Manufacturers**  
**208 North Wabash Ave., Chicago**

given in Mark's Mechanical Engineer's Handbook:

| Fuel.       | Type of engine. | Range of comp. lbs. sq. in. pres. | Avg. comp. pres. lbs. sq. in. pres. |
|-------------|-----------------|-----------------------------------|-------------------------------------|
| Gasolene... | Automobile ...  | 45-95                             | 65                                  |
| Gasolene... | Stationary .... | 60-105                            | 70                                  |
| Kerosene... | Fuel vaporized. | *45-85                            | 65                                  |
| Alcohol...  | Fuel vaporized. | 120-200                           | 150                                 |

\*Watering.

The following are the usual absolute compression, explosion and mean-effective pressures for the average fuel:

| Usual com. pres. lbs. per sq. in.        | Usual ex. pres. lbs. per sq. in.          | Mean effective pres. lbs. sq. in.       |
|------------------------------------------|-------------------------------------------|-----------------------------------------|
| Rich mix. 60-75                          | Rich mix. 225-300                         | Rich mix. 70-85                         |
| Lean mix. 75-120                         | Lean mix. 300-375                         | Lean mix. 65-80                         |
| Lean gas. 120-180                        | Lean gas. 270-375                         | Lean gas. 65-80                         |
| Liquid fuel with low boiling pt. 45-75   | Liquid fuel with low boiling pt. 180-300  | Liquid fuel with low boiling pt. 55-80  |
| Liquid fuel with high boiling pt. 60-120 | Liquid fuel with high boiling pt. 150-300 | Liquid fuel with high boiling pt. 50-70 |

We thank you for your words of appreciation.

\* \* \*

### Clutch and Babbitt Metal.

Will you please publish in your next issue an explanation of the clutch on the Saxon car, and also how to make Babbitt metal?—J. C.

The clutch on the Saxon Six is of the dry plate construction, lined with Raybestos. The clutch consists of four plain steel plates, *M*, as shown in Fig. 1, and three, *A*, with double facing of Raybestos, making six Raybestos surfaces. The Raybestos disks are driven from studs on the flywheel, and the steel plates are driven from studs attached to the clutch hub.

When the clutch is thrown out, these plates are allowed to separate, the Raybestos-faced plates revolve with the fly-

wheel and the steel disks remain stationary.

When the clutch is let in, the clutch springs force both sets of plates together and the whole combination rotates, driving the propeller shaft, which in turn drives the transmission and the rear axle.

To adjust the clutch, release the jamb nut at *H*, and turn the adjusting nut at *H*, to the right until the spring, *I*, is shortened about 1/8-inch. Adjust all three springs at the same time and lock the jamb nuts securely. If this does not overcome the trouble, the clutch should be taken out and thoroughly cleaned with

gasolene. This cleaning is very essential.

The clutch bearings, *E*, should be cleaned and packed with grease every 2,000 miles. The easiest way to do this is with a grease gun, through *C*.

It is best to buy the Babbitt metal from some reliable firm rather than attempt to make it. However, if you desire to make your own the following specification, which is the S. A. E. standard, is used for the connecting-rod linings of engine bearings:

|                |                |
|----------------|----------------|
| Tin .....      | 84.00 per cent |
| Antimony ..... | 9.00 per cent  |
| Copper .....   | 7.00 per cent  |

\* \* \*

### Carburetor Adjustment.

1. We think we have adjusted the carburetor on a Dort car correctly, but the engine does not seem to have the right power. There is no indication of a rich mixture and everything else seems all right. What do you think is the trouble?

2. How should this carburetor be adjusted?

3. What should be used to grind the needle valve and seat?

4. Do you recommend mixing ether with gasolene?—C. B.

1. The trouble may be due to a weak or late spark, poor compression, poor carburetor adjustment, clutch slipping or brakes dragging. If the engine responds quickly to the touch of the throttle when car is standing still, the trouble is in the clutch or else the brakes are dragging. Otherwise, look to the ignition system.

2. To properly adjust the carburetor, set spark lever for normal operating conditions and retard throttle lever.

Then turn in the low-speed adjustment screw, *D*, shown in the accompanying illustration, until the motor misses. Then

back screw out just enough to get motor hitting properly.

This carburetor is provided with a float lever adjustment to insure the proper amount of gasolene for acceleration. If the mixture is too rich on acceleration, the float level should be lowered. If it is too lean, the float level should be raised.

To adjust float level, first shut off the gasolene at main tank. Then loosen cap screw *P*, which attaches strainer to carburetor and loosen the needle seat locknut, *S*.

Turn the needle seat, *R*, out to raise the float level and in to lower the level. After obtaining the correct level, which is purely a matter of give, tighten the needle seat locknut, *S*, and replace the screw, *D*, which attaches strainer. Be sure that the gaskets are put back in place and the screw, *D*, properly tightened to prevent leaking at the joints.

These adjustments should be made when the motor is thoroughly warmed up. By means of the throttle adjusting screw, *F*, the desired idling speed of the engine can be obtained.

3. It is best to simply turn the needle as in grinding valves, using a little pressure, but no grinding compound. If this does not help, use a little whiting.

4. No. Unless you are acquainted with the physical and chemical properties of ether.

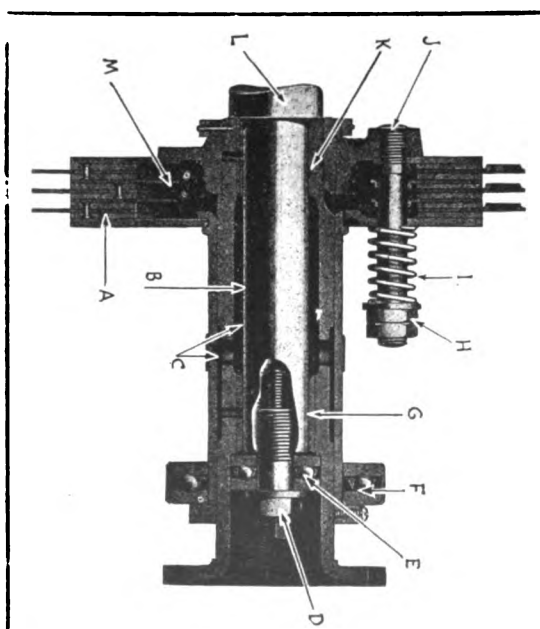
\* \* \*

### Reducing Gasolene Used In Carburetor.

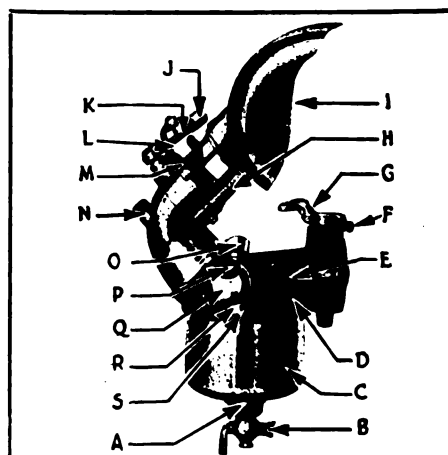
How can I cut down the gasolene the carburetor is getting. I think it is using too much. The car is an Overland with a Tillotson carburetor, 1917 model.

You want to reduce the amount that is used in the carburetor itself. At the bottom of the carburetor is a so-called needle valve adjustment.

This valve should be turned to the left while the engine is running. Turn it slowly. After each slight turn, open throttle and close it again, noting if engine picks up without choking. Continue process until the adjustment causes the engine to pick up poorly, then turn the needle back to last adjustment that gave good results.



The Clutch on the Saxon Six.

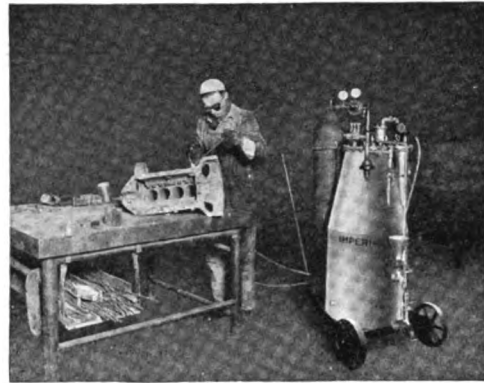


The Dort Carburetor.

# Make your own acetylene gas!

With an Imperial Automatic generator you can make acetylene at about one-fifth the cost of gas compressed in cylinders.

Eliminate express bills, dray hire, delays while tanks are refilled, running short of gas on a big job—the high cost of welding—all these are done away with the day you install an



## Imperial Automatic Acetylene Generator

Remarkably simple—no clockwork, weights, or complicated mechanism control its operation. The feeding is done by a simple vibrator of the dashpot principle with but one moving part. This vibrator is operated directly by the gas flowing through it from the generator into the torch. Gas generation can start only when the torches are lighted and stops when they are extinguished, making the generator absolutely automatic.



No acetylene regulator is required as an absolutely constant pressure is maintained at all times. Imperial generators have been used for hours at a time without it being necessary to adjust flame of torch.

A water seal cools the acetylene and prevents a flash back from ever reaching the machine. Interlocking safety levers compel the user to follow the proper sequence of operations necessary to start or shut off the Imperial Generator.

The Imperial Automatic Acetylene Generator is of the medium pressure, carbide to water type, and is made in 15, 25, 50 and 100 pound sizes.

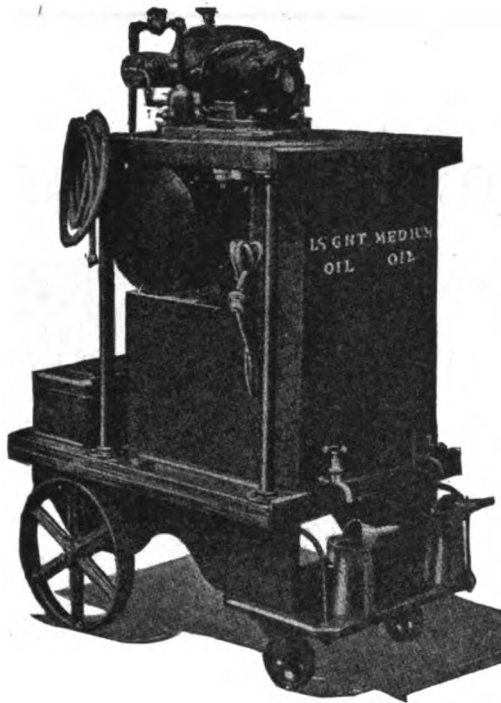
### Write for Facts

Your present welding equipment will return bigger profits the moment you adopt this modern, money-saving system of generating acetylene gas. You know Imperial quality—that's enough! Write today for complete information.

## The Imperial Brass Manufacturing Co.

1224 W. HARRISON ST., CHICAGO, ILL.

Makers of Welding, Cutting, Carbon and Lead Burning equipment and supplies



## Service Plus a Sale

The Utility Model is our ideal portable free air outfit. It is designed to remind your "free air customer" of his need of oil.

For suburban garages and service stations and along the much frequented motor highways it has proved itself a great money-maker, capable of earning from 100 to 150% of its first cost in a year. It isn't necessary to mention oil to a motorist; the presence of the oil equipment suggests it.

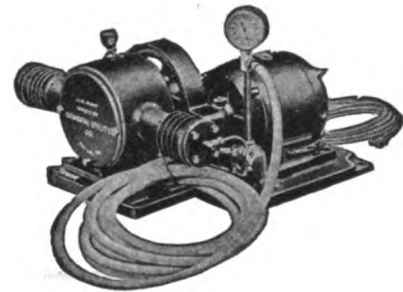
The equipment consists of a strong durable truck with ball-bearing casters and convenient handle; two 20 gal. oil tanks; our standard compressor and motor unit; a 12" x 24" tank, tested to 300 lbs., with a guaranteed working pressure of 150 lbs.; air gauge; safety valve; oil separator; 25 ft. best 5-ply rubber hose; 17 ft. electric cable with socket plug; and a tool box. Assembled complete for installation.

Write us for complete information about the General Line of Air Outfits.

We deal through exclusive distributors only. Some unclosed territory is still open for applicants.

The General Two-Cylinder Air Compressor with its gear-to-gear connected  $\frac{1}{2}$ -horsepower, ball-bearing mounted G. E. motor, is the standard compressor unit on all General Utility outfits.

It is the product of eight years of experience and experiment and has proved in hundreds of garages and service stations that its single-stage, horizontal opposed two-cylinder construction is the most efficient design that has ever been developed. It will pump over 5000 cu. in. of air per minute and do this at an unusually low cost for current.



The General Compressor shows the high quality of its design in its remarkably low cost of upkeep. With reasonable care it will give years of service without trouble or expense.

It is rigidly mounted on a common bed plate with the motor. The motor is series wound and will start on load.

Export Department  
17 Battery Place  
New York, N.Y.

*Two Cylinder*  
**GENERAL**  
AIR COMPRESSORS

**UTILITIES SALES**

*Sales Rep*  
**GENERAL UTI**

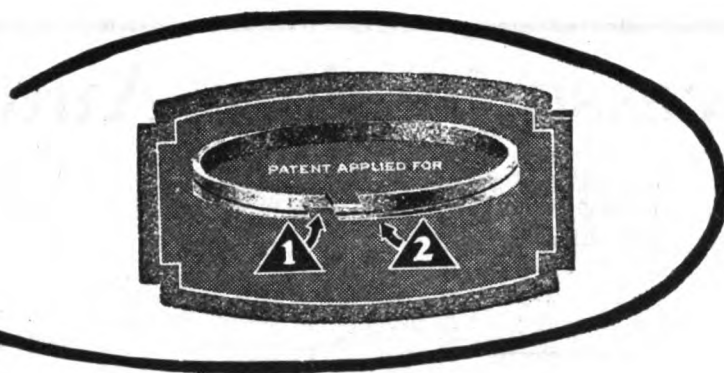
Factory 1324 Ogden St. Philadelphia - Office 80

*Utilities that Sell*

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



*just  
enough  
Oil*



—provides for lubrication

## Too Much Turns to Carbon Too Little Creates Friction

The life story of many piston rings can be written in eight chapters. I—Incorrect design. II—Insufficient lubrication. III—Excessive friction. IV—Cylinder wear. V—Oil leakage. VI—Carbon trouble. VII—Compression leakage. VIII—Premature failure.

The remarkable wandering oil groove of the General Lightning Cut Ring gives the interesting story of controlled oil distribution.

During the usually destructive wearing-in period it provides just enough oil at heretofore unreachd high points on the cylinder walls. It lessens the natural friction between ring and wall. The result is a longer period of efficient service.

Long after other rings begin to admit too much oil into the combustion chamber and clog it with carbon, the wandering oil groove of the General Lightning Cut Ring continues to provide only just enough oil. Its scraping edge functions to return all excess oil to the crank case; to check compression leakage; reduce oil consumption and to indefinitely postpone ring failure.



### GENERAL LIGHTNING CUT PISTON RINGS

The lightning cut itself, combining, as it does, the old step and diagonal cuts, provides a most effectual control of the compression charge.

Three other features of design—the individual cast—its concentric shape—and one-piece construction make for maximum piston ring efficiency.

The dealers, repair shop and garage men, who have waited for a piston ring they could guarantee to give increased power, greater mileage, fuel and oil economy and less friction and wear, are invited to participate with others who have adopted our revolutionary, profit-sharing sales plan in the marketing of piston rings.



# CORPORATION

Representatives

ITY COMPANY

New Stock Exchange Bldg., Philadelphia

Two Cylinder  
**GENERAL**  
AIR COMPRESSORS

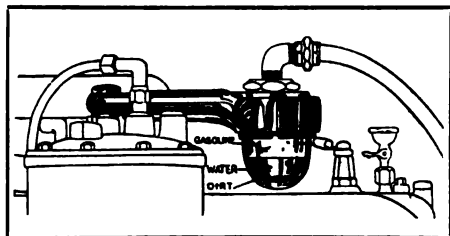
*Because They Serve*

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Accessories For Automotive Trade

## Unique Visible Gasolene Filter and Dash Sight Oil System.

It is embarrassing to be caught at the wrong time. The only way not to be caught is to do the catching yourself and



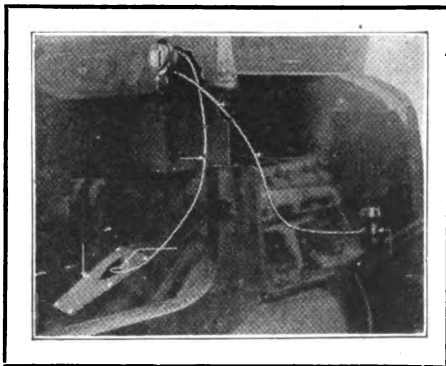
Gasolene Filter With "Little Glass Cup."

catch trouble before it gets to the carburetor and engine. Dealers will be interested in the Steward visible gas filter which the Automotive Material Co. recommends for all gasolene troubles.

This filter is made of a high quality of brass, carefully machined. It is said to be easily attached. All necessary fittings are already on the apparatus and the vacuum tank. It is simply a matter of attaching one end to the tank and the other end to the intake tube. Gasolene comes in through the intake tube, flows down into a glass trap cup, goes upward through an 80-mesh wire screen, and out through the shank to the vacuum tank.

Through the glass cup all foreign particles can be easily seen. In a jiffy and a twist, the little cup can be taken out and cleaned while the engine is still running. The cup also acts as an automobile lock. By removing or even only unscrewing the bushing, the gas feed is disconnected.

The manufacturer guarantees that the filter means an easier starting engine, a smoother running engine, an engine that can be depended on, an engine that will



Visible Dash Sight Feed Oil System.

run a car better, longer, smoother and more economically.

The Automotive Material Co. is also putting on the market one of the most needed devices for a Ford—a positive sys-

tem of oiling, with visible feed. With this system it is said to be possible to know absolutely when a car has sufficient oil and that oil is circulating.

Right before the eyes, on the instrument board or dash, a stream of oil constantly circulates through a gage and then through a strainer, lubricating every part, preventing burned-out bearings and scored cylinders.

When the oil is near the danger level, it stops flowing through the gage—thus giving warning that the oil supply needs replenishing before the car travels more than 20 miles farther.

Further particulars and trade prices concerning the visible gasolene filter and the dash sight feed oil system will be given to those writing the Automotive Material Co., 208 North Wabash Ave., Chicago. Mention the American Garage & Auto Dealer when writing for this information.

## Cloud Accessories Corp. Has Fan Belt With Unusual Qualities.

A fan belt for Ford cars guaranteed for one year and which the makers declare will last much longer, has been placed on the market. It is the Morgancord fan belt, sold by the Cloud Accessories Corp. The belt is said to be different in structure from all other belts. One reason for its unusual strength and durability is the vulcanized cords running through the length of the belt.

Kenneth Cloud, president of the Cloud Accessories Corp., conceived the idea of placing cords in the fan belt from observing rope transmission drives in operation. He took his idea to G. F. Morgan, formerly of Morgan & Wright, bicycle tire manufacturers, and after much labor, experimentation, and many tests, a fan belt was constructed which possesses flexibility, durability, and heat resistance qualities.

A study of the fan belt explains its many unusual qualities. It is built on the principle of a cord tire. Close to the wearing surface there is a series of small vulcanized cords closely imbedded within the belt. Above this layer of small cords there are five larger cords, also vulcanized. All are vulcanized to the tightly woven rubber fabric.

It is claimed that moisture, grease or dirt cannot penetrate the belt and cause deterioration. The seam is in the center of the outer surface, leaving no surface for the absorption of foreign substances. The Morgancord fan belt has a strength of 1,000 pounds, and its heat resistance is 300 degrees Fahr.

Write to the Cloud Accessories Corp.,

1408 South Wabash Ave., Chicago, for further particulars. Mention the American Garage & Auto Dealer when writing for information.

## Many a Slip 'Twixt Foot and Pedal Saved by Pedalgrips.

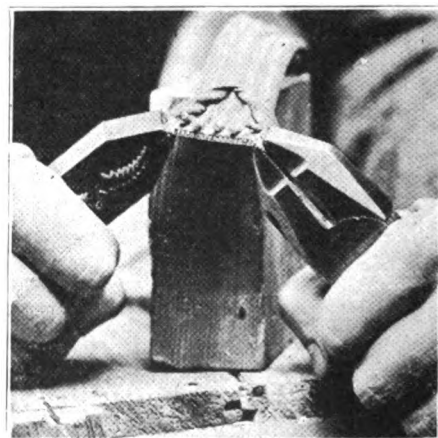
Mr. Dealers, your customers will appreciate the mental relief that comes from knowing that the pedals on their Ford cars will work without a miss or slip. Pedalgrips, manufactured by the Stader Metal Specialty Co., are attachments which widen the footrests.

They are fastened to the Ford pedal by four lips which, when bent under, hold the device firmly. No bolts, nuts or screws are required in installing Pedalgrips. The manufacturer claims that making brakes and transmission respond perfectly prevents unnecessary strain and wear on linings and mechanism. The attachments are said to be well made of high quality material, with non-slip rubber tread.

Dealers should write to the Stader Metal Specialty Co., 310 South Canal St., Chicago, for further particulars and trade prices. Every Ford that passes your shop will be interested in a set of Pedalgrips to make its pedals safe. Mention the American Garage & Auto Dealer when writing for further particulars.

## Efficient Theft-Proof Lock and Other Products of Wood Co.

One of the newest and efficient theft-proof locks on the market is that manufactured by the W. C. Wood Co. It is

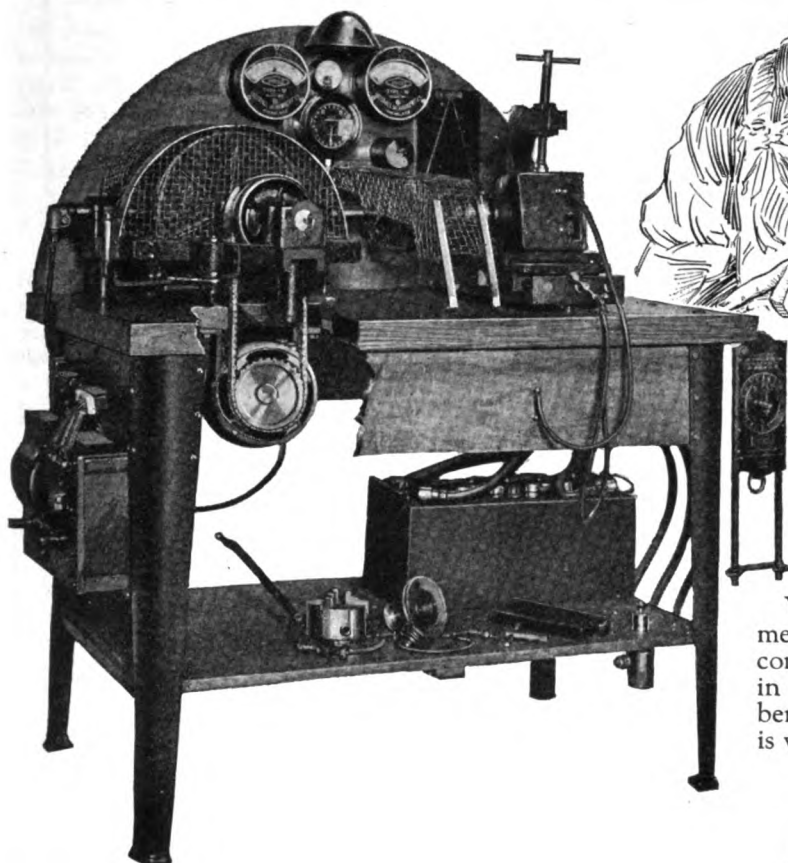


The Morgan Cord Fan Belt Is Unique.

known as the Ford transmission lock and is called "Everloc."

About 15 minutes is the time required for installing this device. The manufacturer guarantees that it will lock the car so that it cannot be towed away. When the key is turned, both rear wheels are

# Bigger Profits for YOU—NOW



**Y**OUR ability to test any generator starting motor or magneto thoroughly and in a very small amount of time, which you can do with the Becker Bros. Universal Test Bench, is the kind of service your customers are looking for.

You know from experience that such an equipment will enable you to make your service complete—such a service pays big profits, not only in cash business, but in satisfied customers. This bench is very easy to operate—its cost of operation is very small.

## Sold On Cash or Monthly Payment Plan

Whether you desire to purchase the Becker Brothers Universal Test Bench on the cash or installment plan, do not hesitate—every day you do without an equipment of this kind, you are losing a great deal of profit you might as well have. Write us today for complete description and prices—no obligation.

### BECKER BROTHERS

23-25 N. Jefferson Street - Chicago, Ill.

**B.B.B.**

*Stands For Quality*

Becker Brothers' Brushes stand for quality. You may rest assured that the bench will prove just as satisfactory.

## You Can Buy This Bench Complete or the Parts Separately

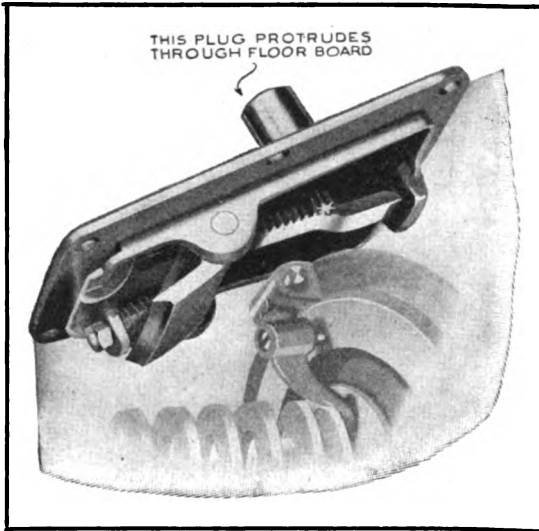
We have prepared a folder which gives photographs of all the highly important parts as well as a complete description—it even shows you how to operate the bench.

After reading the description of the Becker Brothers Universal Test Bench and parts in this folder, you will be better able to decide whether you need a complete bench or the parts themselves. The folder will be sent you free on request.

# Becker Brothers UNIVERSAL TEST BENCH

locked. The main plate and the latch which take the strain are made of malleable iron and it is impossible to break them.

In addition to manufacturing this theft-proof lock, the Woods company has a solution for the problem of repairing punc-



The Everloc Prevents Car Thefts.

tures and blowouts. It has produced three types of cold patches—an all rubber patch in sheet form, a fabric back patch, and a new "Everloc" fabric insert patch.

The all rubber patch is made of the highest grade materials obtainable and is said to prove satisfactory in the repair of small cuts and punctures. The company, does not guarantee this patch, however, for repairing large blow-outs. For this purpose the fabric insert patch and the fabric back patch are guaranteed. These patches can also be used in any other size puncture or blowout.

Trade prices and more detailed information concerning these products may be obtained from the W. C. Wood Co., 105-7 Western Ave., Milwaukee, Wis. Mention the American Garage & Auto Dealer when writing for further particulars.

### New Era Tire and Wheel Carriers Present Favorable Features.

The popularity of the 1920 model tire carriers which the New Era Spring & Specialty Co. is presenting to the trade is assured—for these devices are both simple and practical in design and construction.

New Era tire carriers are manufactured in several different types and sizes. The Sly interchangeable rear tire carrier, the manufacturer claims, satisfactorily accommodates all Ford and Chevrolet-490 tires, either alone or where the casing is on demountable rims, holding by expansion grip inside of the rim. All contact or chafing is said to be avoided. A place for the lamp and number plate is combined, and provision is made for locking through holes in the adjusting turnbuckle. This carrier is quickly and rigidly attached to the frame by one U-bolt. A small L on the arm catches on the cross frame.

Ideal for delivery cars is said to be the "Better" strapless side-tire holder. It is of steel construction throughout. The locking device is a part of the holder. No chains are necessary for locking the casing in place. Tire supports are a part of the holder and no straps are needed to support the tire. Where demountable rims are not used, a self-expanding carrying rim is furnished.

The demand for New Era carriers caused the manufacturers to design special models for manufacturers of Pasco, Hayes, Dayton, Houck and Frayer-Miller wire wheels, and Minute and Simplicity demountable wood wheels. All weight-carrying parts are made of steel, angles being used where the stress is greatest, making the wheel sufficiently strong to carry several times the required weight.

Attachment is made to the rear spring clips, and there are but four nuts to tighten. A hole in the hub bolt is provided for locking the wheel and tire to the carrier by means of a band. This prevents the removal of the tire by deflating—making a positive lock.

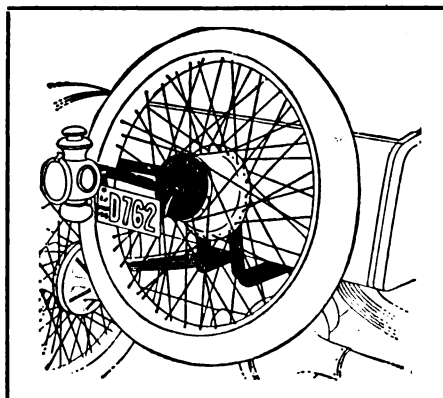
For touring car and sedan the carrier is interchangeable and is designed to follow the body line of the car.

The New Era Spring & Specialty Co., 156 Cottage Grove Ave., Chicago, will send trade prices and descriptive literature concerning these several models to all those who write to it, mentioning the American Garage & Auto Dealer.

### Inserting Pistons Without Injury to the Fingers.

The Fairbanks Co., is merchandising an interesting device for inserting pistons without injury to rings, or cutting of fingers, which is known as the Duplex piston inserter.

In using this piston inserter, the device is placed on the top or bottom of a cylinder and the piston pushed through the tapered spring steel jaws automatically compress the rings firmly and evenly as they



A Wheel Carrier with Unusual Strength.

pass through and with a single operation, in a second's time, the piston is inserted.

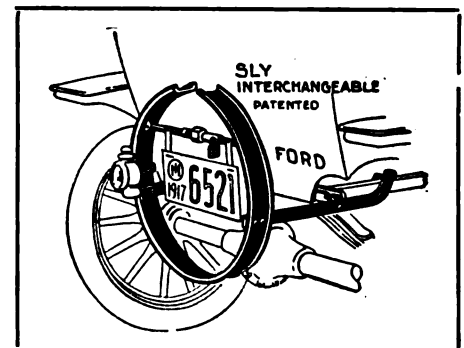
The device may be unlocked on one side, allowing it to slip over the connecting rod when it is used inside of the crank-case. Further particulars will be given to those who write to the Fairbanks Co., Broome & Lafayette Sts., New York City, mentioning the American Garage & Auto Dealer.

### Witty, Pithy, Sayings for Use on En-ar-co Boy's Slate Sign.

"Cheer up! The less you have, the more there is to get." That's only one of many humorous messages in the Every Other Day Epigram Service—for the exclusive use of En-ar-co dealers.

The National Refining Co., for a reasonable sum furnishes to dealers in En-ar-co products, a boy and slate sign, well made and weatherproof. The sign stands six feet high, with a writing surface on the slate 3 feet high by 5 feet wide. The sign is painted with several coats of paint, in black, red, pink and white. The lumber is either southern pine or basswood.

All boards are firmly fastened together with corrugated nails put in from each side. The blackboard is finished in such



A Popular Model Tire Carrier.

a manner as to make the use of ordinary chalk or whitening paint entirely practical.

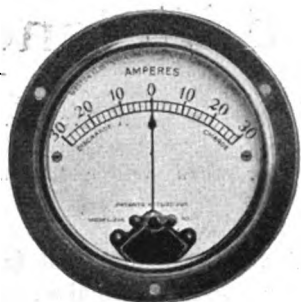
Every month a 30 days' supply of epigrams, to be changed every day on the slate, is supplied by the En-ar-co advertising department.

No one can fail to be attracted by the frowzled headed schoolboy with his huge sign. He commands attention from a distance and his timely messages are sure to make one think. People will soon go out of their way to read what is on the slate, the same as they look for their daily cartoons in the newspaper.

### New Tubular Radiator for Heavy Duty Motor Vehicles.

A new tubular radiator especially designed for heavy duty trucks and tractors is announced by the Hooven Radiator Co. This radiator is the result of more than two years of concentrated study and experimenting by Hooven engineers.





Model 354  
**Ammeter**

For the dashboard or cowl. Tells instantly and accurately the exact condition of the battery.

# Supremacy!

Wherever the science of electrical measurement is known and practiced throughout the civilized world, Weston Instruments are recognized as the standard of construction, accuracy and serviceability.

In the motor field, this supremacy is evidenced by the almost universal demand by manufacturers of high-grade cars and boats, and by garages and service stations for Weston Instruments.



## Weston Electrical Indicating Instruments for Motor Cars and Boats and for Garages and Service Stations

are advertised in the large national magazines with circulations reaching into the millions. When you cater to the demand thus created you not only give your customer the most efficient Instruments but you build your own business. There is good profit for you.



Model 280  
**Garage Testing Set**

Most complete, reliable and perfect testing instrument ever designed for garage and service station use. Makes every type of test known for automobile electrical equipment. Has six ranges—30 and 3 volts, 100 milli-volts and 300. 30 and 3 amperes.

**Weston  
Electrical  
Instrument  
Company**

30 Weston Ave.,  
NEWARK, N. J.

**Branches  
in All  
Principal  
Cities**



Model 301  
**Ammeter**

For the bulkhead or cowl. An instrument of extreme refinement—sensitive, yet rugged and sturdy.



**Battery Testing  
Voltmeter**

Model 443

Takes exact measurements of the E. M. F. of individual cells. Also provides for the Cadmium Test.



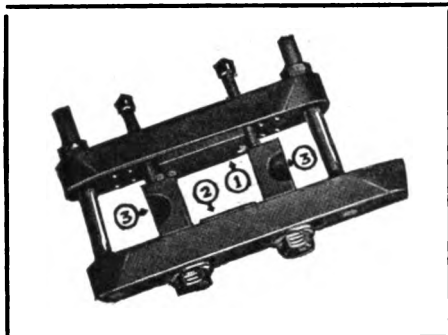
Model 441  
**"Fault Finder"**

A general utility instrument. Makes every test except measuring starting current. Has separate voltmeter and ammeter—cables for plugging into instrument—clip terminals to quickly connect to circuits. Ammeter protected by replaceable fuse to prevent burnouts.

# Garage Equipment for Better Efficiency

## Compact Atlas Abrasive Tool for Truing Crankpins.

No matter how conscientious the garageman may be, he often hesitates to tell a car owner the truth about motor knocks that are caused by crank pins being worn oval. Only a few garages have a lathe large enough to handle a crankshaft. Even if they are fortunate enough to have such



Atlas Company's Little Machine Shop.

equipment, the job of truing-up bearings and pins is not an easy one and a job finished to stand the test of a good pair of micrometers, often costs as much as a new crankshaft.

Every garageman can now own an inexpensive tool that will allow him to handle crankshaft grinding jobs in a better fashion than they have ever been handled before, with the Atlas abrasive tool, claims its manufacturer. A pin can be trued-up in less than an hour and the work done without removing the crankshaft from the crankcase.

The tool is a simple, compact little fellow. It has but one cutter, cuts in one direction only, and is adjustable by the same sense of "feel" that one uses in operating a micrometer. The working parts consist of a hardened and tempered steel cutter, bronze track bearings, and adjustable abutment blocks.

This little "machine shop" will be of value to our readers. Further informa-

tion and trade prices can be obtained from the Atlas Mfg. Co., 902 N. Canal St., Pittsburgh, Pa. Mention the American Garage & Auto Dealer when you write for full particulars.

## Craft Combination Steam Vulcanizer a Complete Workshop.

Any man entering the vulcanizing business today has the greatest assurances of permanence and constantly growing prospects. With a Craft vulcanizer, the Wood-Craft Co. claims that a man is equipped with a machine of great capacity for money making—a machine that is the masterpiece of its inventor, W. C. Craft.

The essential elements for success which this machine embodies are given as: Large capacity, having a cavity for every size of tire; great speed; service—every cavity is always under steam; economy in operation because of the thick wall, heavy single block type of construction which enables the Craft to hold and maintain an even temperature at a low cost.

The 1920 Model No. 5 Craft combination steam vulcanizer is a complete workshop in itself. The fittings complete consist of nine pairs semi-steel bead moulds, as follows: five clinchers, 3, 3 1/2, 4, 4 1/2, 5 inches; four straight sides 3 1/2, 4, 4 1/2, 5 inches; one 24-inch tube-plate, 5 ins. wide, 3 ins. deep; one 3 1/2, 4, 4 1/2-inch inside vulcanizing arm; one inside core clamp; two rows of adjustable screw clamps to adjust bead moulds; four clamps for tube plate; four hardwood tube blocks; one gas regulator for No. 5-1. The shipping weight is 1,000 lbs.

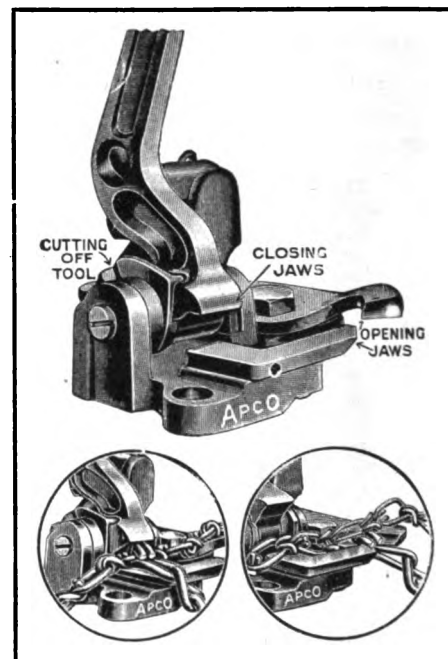
The company also manufactures over-size models and three-cavity models. To any purchaser of the Craft machine, the manufacturer gives a practical course of training in the art of vulcanizing free of charge with one of its nearest distributors.

Complete details and trade prices will be sent to those who write to the Wood-Craft

Co., 1485-87-89 Marshall Ave., St. Paul, Minn. Mention the American Garage & Auto Dealer when writing for this information.

## Rugged and Efficient Tool for Repairing Tire Chains.

The garageman or fleet owner has always wanted a real tool for replacing cross links in tire chains. The tire chain repair tool, made by the Apco Mfg. Co. will meet



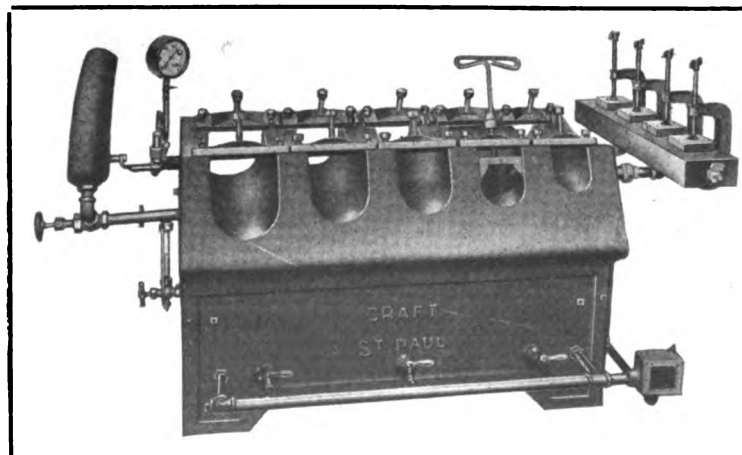
A New Tool for Replacing Cross Links.

with favor among those who have this work to do, and its rugged simplicity and efficiency will have a particular appeal.

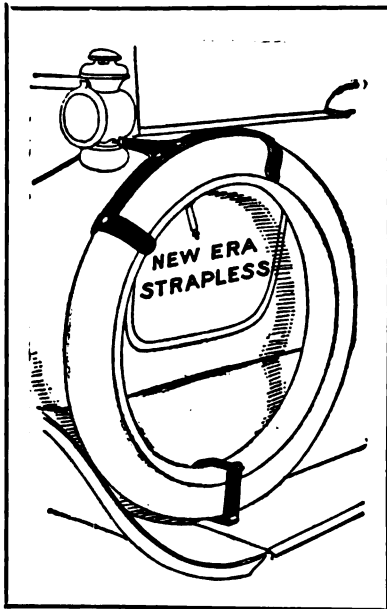
The operation of the tool is very simple. The device is bolted to the bench and the 18-inch handle is held in the right hand. The chain, previously laid along the bench, is pulled into position with the left hand. Pushing the handle away from the operator, opens the side link. After the new cross chain is placed in position under the closing jaws, the handle is pulled towards the operator, closing the links with very little effort.

The wire cutter can be used for shortening the side chains or cutting the cross chain hooks. The tool is made from malleable iron and tool steel. All wearing parts are hardened and adjustable. The finish is black enamel and the device is packed complete with bolts and a detachable handle in a heavy box. Its weight is six pounds.

Every garageman will be interested in this tire chain repair tool. The Apco Mfg. Co., Providence, R. I., will give complete information and trade prices upon request.



The Craft Vulcanizer is Said to be the Masterpiece of Its Inventor, W. C. Craft



No. 300. Price, \$2

## A Million Tire Carriers on 1920 Fords

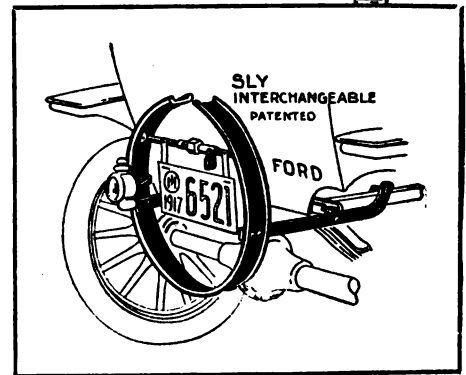
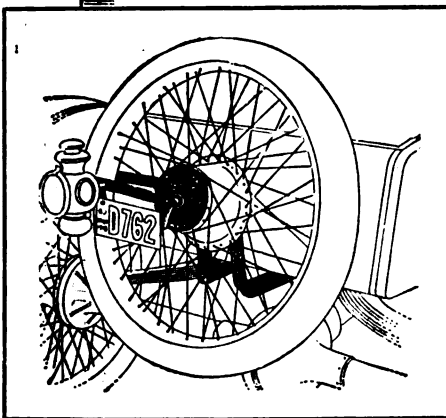
It is possible to sell them on Touring Cars and Roadsters as **ONLY** the enclosed Fords (about 50,000) are Carrier equipped.

### ANOTHER MILLION FORDS

yet need some one of the 20 different Tire Carriers in the **NEW ERA** complete line for **EVERY** Ford need. **ALL**—quickly—rigidly attached without drilling or cutting—and—stay put—without rattle or vibration.

ALL

Quick Acting  
Strapless  
Provide for Lock  
Properly Designed  
Fit Every Ford

No. 150  
Interchangeable, \$6Furnished for Pasco  
and other Wire  
Wheels, \$6

EVERY Ford car needs a New Era Tire Carrier just as much as ever. Live dealers who stock are selling thousands. How about YOUR Stock?

BE SURE to insist on seeing NEW ERA name on and back up the only line constantly advertised **AND** order **NOW** to avoid delays of next six months.

Write today for catalog describing NEW ERA Tire Carriers—Springs—Spring Bumpers and address of nearest jobbers.

## NEW ERA SPRING AND SPECIALTY CO.

156 Cottage Grove Ave.

Grand Rapids, Mich.

Mention the American Garage & Auto Dealer when writing for further particulars.

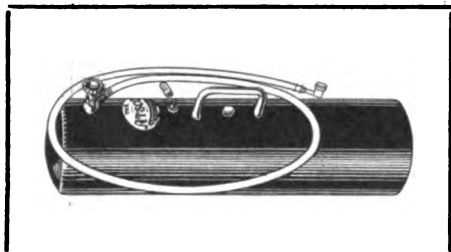
### Air-Tight Steel Tanks of All Sizes and For All Purposes.

Twenty-five years ago the Air-Tight Steel Tank Co. began the manufacture of copper-brazed tanks. Genuine copper-brazed tanks are of such special construction that they cannot be directly compared with riveted tanks. However, the principal points of superiority, the makers say, lie in the fact that the seams and joints are much stronger than the balance of the tank, and that they are absolutely air-tight. In addition to copper-brazed construction, several other methods are employed including electric or acetylene welded, or riveted.

These tanks come in nearly all sizes from six inches in diameter to the largest that can be shipped on a freight car—round, square, rectangular, or special tanks, with special or machine fittings.

For garages the company has specially designed pressure tanks in all sizes and for all pressures. It guarantees that when one of these tanks is filled with air or gas to several hundred pounds' pressure, the next year or year following, the same pressure will be found in the tank.

The Atsco portable air tank road repairs is a special product of the company. It is genuine copper-brazed. The tank is 10 inches in diameter by 36 inches long, good for a working pressure of 250 pounds per square inch, or a test pressure of 500 pounds, and it is said to be strong, light, and easily handled. The outfit is complete with a standard tire-filling valve and protection cap for filling the tank from the regular connection on the storage tank or pump, a very heavy discharge valve to which is attached an 8-foot length of hose, and an automatic valve for filling tires.



Portable Air Tank for Road Repairs.

Descriptive literature will be sent to any interested reader of the American Garage & Auto Dealer. Write to the Air-Tight Steel Tank Co., Pittsburgh, Pa. Mention the American Garage & Auto Dealer when writing.

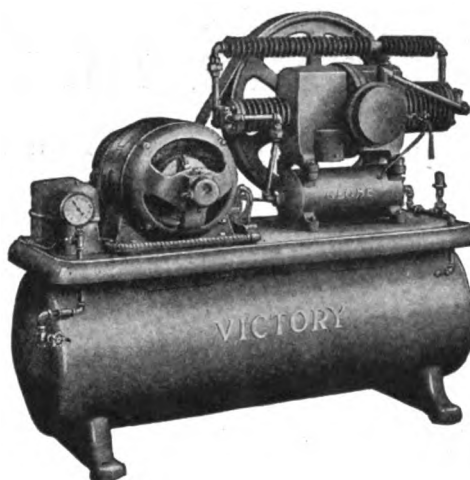
### Substantial and Practical Is Improved Victory Compressor Unit.

For free air stations, garages, vulcanizing shops and any other service requiring a dependable supply of compressed air always on tap, is the Victory automatic

motor drive compressor unit produced by the Globe Mfg. Co.

This unit is substantially mounted on a steel air storage tank, is beautifully finished, and makes a compact, attractive and practical automatic air plant.

The improved Victory unit is furnished in two sizes. The specifications of equipment B-428 which is the smaller Victory unit are as follows: Cylinders, 3 inches and 1½ inches with 3-inch piston stroke. The driving pulley measure 21 inches by 2 inches. Speed: 200 to 275 r. p. m. Capacity: At 250 r. p. m., will fill a 30-



New Victory Compressor Unit.

gallon tank from 0 to 150 pounds in 22 minutes. It is ample for the average garage, tire shop or free air service. The maximum pressure is given at 200 pounds; motor ½ to ¾ h. p. for any current. Air tank: 30-gallon (16 inches by 36 inches) steel.

The manufacturer guarantees that the working pressure is 160 pounds. The fittings consist of a 300-pound pressure gage with needle valve; 25 feet of best air hose with air chuck; brass taper connection and needle valve attached. Height over all 41 inches. Floor space: Nineteen inches by 40 inches; shipping weight, 475 pounds.

The larger size, which is designated as equipment B-438 A, is especially recommended by the manufacturer for air service in connection with giant truck tires. It is said to develop ample pressure and capacity for this service without the necessity of driving the compressor at a higher speed than 225 r. p. m.

The three outstanding features which the Globe company claims for the improved "Victory" unit are: An improved belt drive, which consists of a pliable, endless, flat belt operating in conjunction with a belt idler of special design; a new type automatic controller or switch, which owing to the fact that no adjustments are necessary, has the cover of its case sealed before leaving the factory; an improved automatic pressure unloader which permits the motor and compressor to come up to full speed without pressure load when starting and also insures oil free dry air

by keeping the oil and moisture trap automatically drained.

All Victory units are provided with air storage tanks having a working pressure of 200 pounds to the square inch. Compressor bearings are nickel Babbitt and phosphor bronze, all having convenient provisions for taking up wear, thus insuring great durability and noiseless operation.

Readers of the American Garage & Auto Dealer will be interested in receiving trade particulars and further information concerning this dependable and substantial unit. These may be had from the Globe Mfg. Co., Grand Rapids, Mich. Mention the American Garage & Auto Dealer when writing for further particulars.

### Eclipse Valve Grinder Co. Announces Its Master Grinder.

The output of passenger cars, trucks and tractors for 1920 will, it is conservatively estimated, be close to 2½ million. Added to the enormous number already in use, the figures stagger the imagination; the numbers are so vast that slow methods of manufacture and maintenance will not do. Time and labor-saving devices are necessary.

The Eclipse electric valve grinder was designed to eliminate the slow, laborious method of grinding valves by hand. The mechanic who designed and patented the original Eclipse grinder had been taught by experience that a positive and rapid backward and forward, or oscillatory movement to do the grinding and a slow rotary movement to continually turn the valve to a new position and insure a uniform amount of treatment on every part of both valve face and seat were most important.

The ballastic movement which he accordingly incorporated in the Eclipse grinder is unique. The motor of this grinder is controlled by a trigger switch in the handle. The housing is of tough aluminum alloy, made in two compartments, effectively separating the grease-packed mechanism from the motor. The bearings, both for motor and mechanism, are of bronze metal. Gears, pinions and other moving parts are made of the best steel alloys, properly heat-treated to insure



Grinder With Ballastic Movement.





## Tire Protector That really Builds Business for You

The cost of driving a car is rapidly increasing. The price of gasoline is advancing. Tires cost more. Everything incident to the operation of an automobile is getting more expensive.

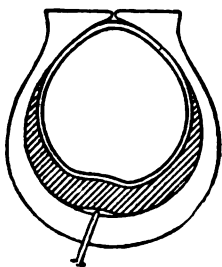
The net result eventually will be less promiscuous driving of motor cars—not fewer cars, possibly, but more careful conservation all along the line in the use of automobiles.

This condition is bound to react against all who sell tires and accessories, unless something can be done to counteract these rising costs.

The Coffield Tire Protector enables you to render a real service to your customers in reducing tire costs. The Coffield reinforces the tire, protecting it against road bruises, punctures and blow-outs, and enables it to deliver a greatly increased mileage.

The Coffield Protector is made of pure, live, rubber, **without fabric**, thus eliminating chafing and heat due to friction. It is really an integral part of the tire itself; and it has all the advantages of similar products, with none of their objectionable features.

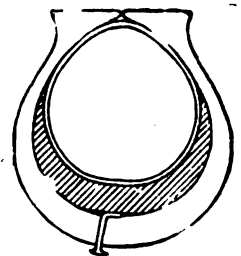
Let us explain to you in detail how we can help to increase your profits, gain more satisfied customers, and insure your tire business against a possible slump in the future, by handling the Coffield Tire Protector. We have an interesting proposition for dealers.



The nail goes thru the outer casing.

# The COFFIELD TIRE PROTECTOR COMPANY

## DAYTON, OHIO, U.S.A.



But the live rubber of the Coffield Protector (having no fabric) merely gives when the nail strikes it — and the nail clinches between the Protector and the casing.

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

great strength and wearing qualities.

Attractive in appearance, compact, symmetrical, and evenly balanced, the grinder is claimed by the manufacturer to be admirably suited for its purposes and easily held in position while valves are being ground in. Although it is only 6½ pounds in weight, the Eclipse has ample strength and power, is simple in operation and has a limited number of parts constructed on mechanical lines.

No adjustments are necessary, but in case the grinder has to be taken apart, the assembly plan is so simple that every part can be taken out and replaced with no other tool than a screw-driver. Parts are interchangeable and to facilitate renewals are listed by diagram numbers on the instruction card accompanying each grinder.

The Eclipse Valve Grinder Co., Sub-Freight Station Building, 20th St. and Oak, Kansas City, Mo., will send trade prices and descriptive literature to all those who write to it mentioning the American Garage & Auto Dealer.

### Acetylene Generators for Lowering Welding and Cutting Costs.

Aside from the important advantage of never running short of acetylene gas just when you have a rush job to do, the Imperial acetylene generator, made by the Imperial Brass Mfg. Co., is said to produce from carbide and water an absolutely pure acetylene gas that insures successful welding and cutting at a total cost of about one cent per cubic foot.

The manufacturer claims many marked advantages for the Imperial acetylene generator, the most important of these being the absence of weights, clockwork, and complicated mechanism. The carbide feed in this outfit is simple, sure, and dependable. It is automatically controlled by the gas consumed by the torch. The generating of gas automatically stops when the torch is extinguished, and is automatically started generating when the torch is relighted. In this manner a constant, even gas pressure is maintained.

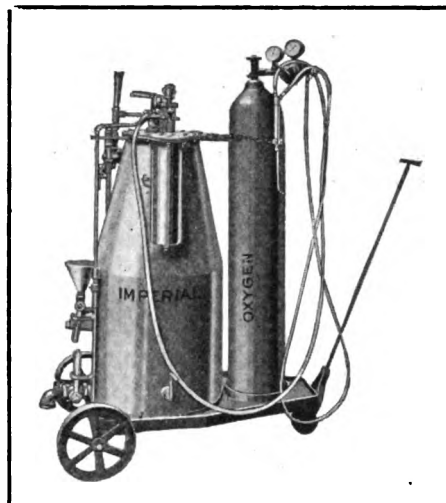
An entirely new device, simple in construction and easily controlled, feeds the carbide into the water—for the Imperial automatic generator is of the carbide-to-water type. The complete feeding mechanism and carbide hopper are fastened to the head of the machine, making it possible to remove all of the working parts by removing the head of the generator.

The feeding is done by a simple vibrator of the dashpot principle, with but one moving part. This vibrator is operated directly by the gas flowing through it from the generator into the torch. The pressure in the generator is controlled by the tension of a spring in a diaphragm governor.

Interlocking safety levers are said to make the Imperial generator absolutely fool-proof, and compel the users to follow the proper sequence of the operations nec-

essary to start or shut off the generator. A dependable safety blow-off makes it impossible to obtain more than 15 pounds pressure, which is recognized as the maximum pressure allowable for acetylene gas.

The gas purifier section of the generator, through which all the acetylene gas passes on its way from the generator to the torch, has a water seal which cools the gas and



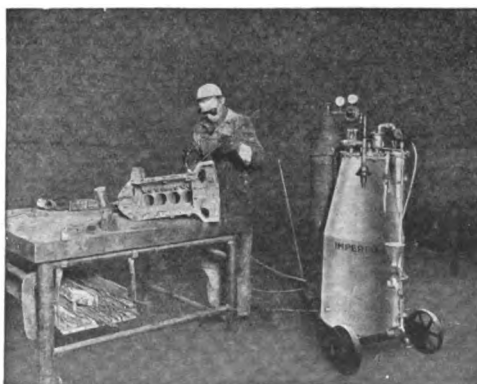
The Imperial Outfit Mounted on Truck.

prevents a back-flash reaching the generator.

In order to meet every service requirement, the Imperial Brass Mfg. Co. is producing the Imperial generator in 15, 25, 50, and 100-pound sizes.

The 15-pound size (capacity, 15 cubic feet per hour; total gas produced per charge, 75 cubic feet) because of its light weight is particularly adapted for small shops in welding and cutting work where portability is an important factor. It is also suitable for battery service stations for lead burning and for light welding and brazing, as it will supply one welding torch using a No. 5 or smaller tip. It will supply one cutting torch using No. 4 or smaller tip. A truck holding the generator and one cylinder of oxygen is supplied with all 15-pound and 25-pound generators unless it is desired to have it omitted.

The 25-pound size (capacity, 25 cubic feet per hour; total gas produced per charge, 125 cubic feet) is recommended by



Showing the Imperial Outfit in Use.

the manufacturer for all garages and general repair shops, for it will supply one welding torch using a No. 6 or larger tip, two welding torches each using a No. 5 or smaller tip; or one cutting torch using a No. 4 or smaller tip. A truck holding the generator and one oxygen tank is supplied with all 15-pound and 25-pound generators unless otherwise ordered.

The 50-pound size (capacity, 50 cubic feet per hour; total gas produced per charge, 250 cubic feet) is designed for large repair shops where practically continuous use is required. Four welding torches can be supplied by it, each using a No. 5 or smaller tip, or two welding torches, each using a No. 6 or larger tip. It will supply four cutting torches, each using a No. 4 or smaller tip. This size is too large to move around conveniently, so no truck is supplied for it.

The 100-pound size (capacity, 100 cubic feet per hour; total gas produced per charge, 500 cubic feet) is recommended by the manufacturer for service where a large number of welding torches are in continuous use. It will supply eight welding torches each using a No. 5 or smaller tip, or four welding torches, each using a No. 6 or larger tip. It will supply eight cutting torches each using a No. 4 or smaller tip. No truck is provided for this generator.

The Imperial Brass & Mfg. Co. guarantees that the Imperial generator will lower welding and cutting costs, save annoying and expensive delays. The ease of operation of the generator and the even pressure and pure gas provided is a source of constant satisfaction to those having the equipment.

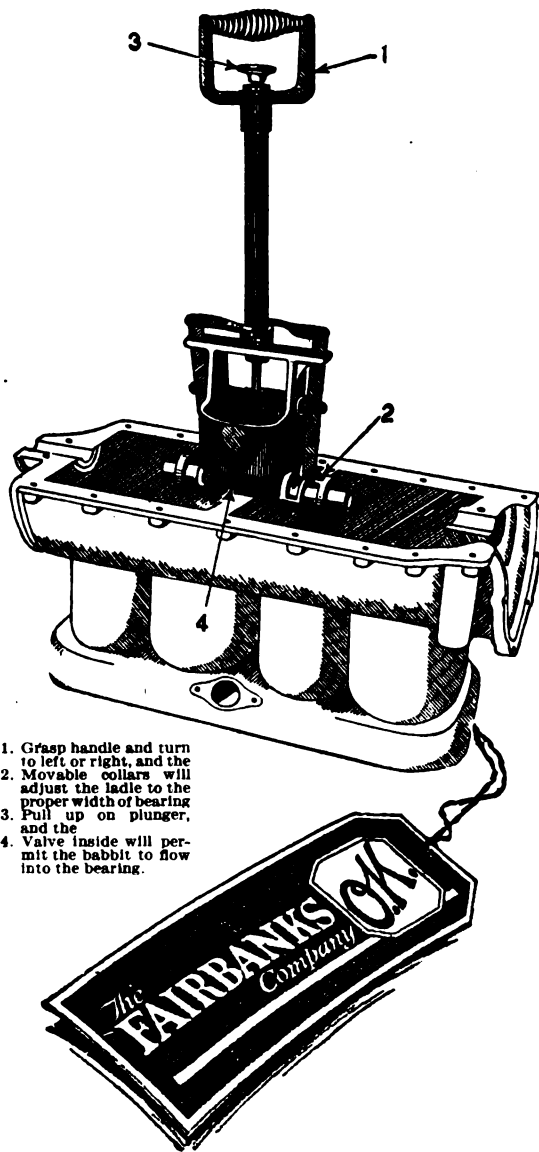
Trade prices and further particulars will be given to those who write to the Imperial Brass Mfg. Co., 1200 West Harrison St., Chicago. Mention the American Garage & Auto Dealer when writing for this information.

### The Bailey-Drake T. & L. Valve Lifter Will Meet Your Approval.

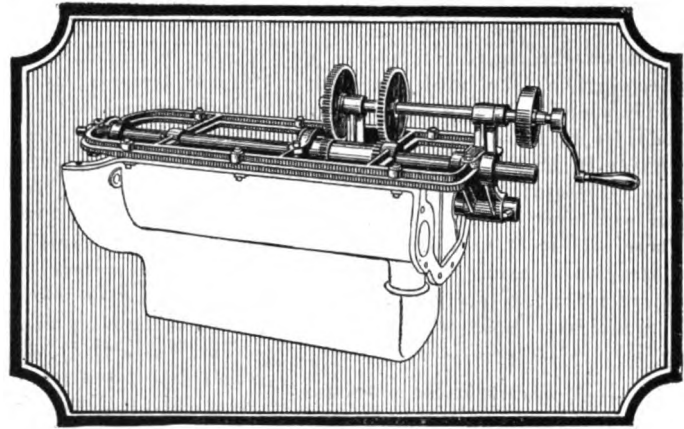
The Bailey-Drake Co. claims that the T. & L. valve lifter which it is producing has enough leverage to lift a house and is as simple as a pair of pliers. There are no hooks, or chains, or springs in connection with this valve lifter. The cam action is said to give unusual leverage and automatically locks the tool without the aid of ratchets or other devices.

Pressed steel carefully inspected and guaranteed by the maker to give absolute satisfaction is used in the manufacture of this tool. Two sizes are produced. A small size which is recognized as one of the standard makes in repair shops throughout the country, and a large valve lifter for general shop use.

By inserting the cotter pin in the upper hole in the cam, a simple adjustment is made which makes the small size adaptable for all T. & L. head motors. The short



**Sole distributors for**  
 The Service Station Equipment Corporation  
 The Hempy-Cooper Mfg. Co.  
 The Bilt Rite Manufacturing Company  
 The Servistock System Corp.  
 The T & T Mfg. Company  
 The Duplex Rim Device Co.



A Hempy-Cooper Boring Machine quickly bores all crankshaft bearings in exact alignment.

## Labor saving machines and tools mean more profits to service stations

THE more cars sold each year, the more repair work must be done. It is not possible for any one service station to meet the repair demands with ordinary equipment.

Ordinary equipment takes too much time. And that causes dissatisfaction with the car owners. Profits are small.

If you are a progressive service station man, you want to keep up with the times.

Therefore, be prepared to reap the full benefits of prosperity by looking carefully into the possibilities of the Fairbanks lines of labor and time-saving repair machines and tools.

**GUARANTEED BY "FAIRBANKS O. K."**

*Fairbanks automobile repair equipment is sold by leading distributors everywhere*

Fairbanks Scales—Trucks & Wheelbarrows—Valves—Engines and Pumps—Power Transmission—Mill, Mine & Railway Supplies—Automobile Repair Equipment—Lincoln Electric Motors—Steel Factory Equipment.

# FAIRBANKS

THE FAIRBANKS COMPANY

Administrative Offices—New York

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DISTRICT SALES OFFICES  
 Eastern, NEW YORK  
 Western, CHICAGO

Southern, NEW ORLEANS  
 Export, NEW YORK



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

handle on this model makes it particularly valuable for use in eight cylinder and other motors with crowded space to work in. The lifting capacity of the small size valve lifter is 230 pounds. The larger model has a capacity for lifting any valve.

The Bailey-Drake Co., 1120 South Michigan Ave., Chicago, will send descriptive literature and trade prices of its product to all those who are interested. Write for this information at once. You will be repaid—and don't fail to mention the American Garage & Auto Dealer when writing.

### Alumiflux—A Remarkable Preparation for General Repairs.

Have you heard about Alumiflux? It was recently placed on the market by the E. C. Harner Mfg. Co. for garage use in repairing breaks, cracks, and holes in water jackets, cylinder heads, crank cases, water connections, radiators, and all automobile parts where tensile strength is not required.

Alumiflux is said to excel for repairing water, gas or steam pipes, steam and water radiator, air or water tanks and their connections. It is not affected by gasoline, oil or water, hot or cold, and will stand heat up to 600 degrees and pressure up to 250 lbs. per square inch. The manufacturer guarantees that it will work successfully with aluminum, brass, iron of all kinds, tin, zinc, lead and copper.

You do not have to take the part from the motor to fix the cracks when you are using Alumiflux. What is more, it is not necessary to turn the motor upside down to repair cracks running from the bottom up, because the ingredients of the preparation force up into any crack when applied. It is claimed to be the only metal in the world today that will flow upwards as well as down.

Alumiflux comes in sticks about four inches long, one dozen in a box. Every repairman will be interested in obtaining further information concerning it. Write to the E. C. Harner Mfg. Co., Benton Harbor, Mich., for further particulars, mentioning the American Garage & Auto Dealer.

### Features of the Tokheim Victory Visible Gasolene Pump.

About a year ago R. F. Diserens, of Fort Wayne, Ind., and associates, purchased the patents and business of the Tokheim Mfg. Co., of Cedar Rapids, Iowa, and started the erection of a large plant at Fort Wayne for building visible gasolene pumps, embodying the Tokheim patents, as well as a general line of industrial oil storage and pumping equipment.

The Tokheim pump is surmounted with a glass measuring cylinder, holding five gallons. Depressing a lever starts a motor in operation which, in about seven seconds, pumps this measure full of gasoline; the customer sees it filling, notes that

the measure is level up to the five-gallon mark and then, having the satisfaction of seeing the liquid drained into the tank of his car, knows that he is getting a full five-gallon measure.

The fundamental feature of the Tokheim pump is an interlocking device by which the act of opening the outlet automatically closes the inlet, and vice versa. The gasoline is filtered during the process of pumping and the presence of any water in the gasoline is immediately detectable, as it stands in the glass measuring cylinder.

The Tokheim Oil Tank & Pump Co. states that it has recently received the approval of the National Board of Fire Underwriters on this equipment.

The Victory visible pump has a commanding appearance, and graceful lines; and reports from dealers indicate that a marked increase in business immediately followed the installation of the pump.

### Sod-Tor-Lite a Combination Soldering Iron, Torch and Light.

Sod-Tor-Lite is a combination of three improved, distinct tools—a self-heating soldering iron, brazing torch, and light, all built very compact, durable and strong, along smooth unobstructed lines. As a soldering iron, its manufacturer, the B. E. Hicken Sod-Tor-Lite Co., claims that it is one of the most perfect devices ever invented. Just connect it to the acetylene gas tank and ignite—you are ready for work.

The iron is easily kept tinned as the heat is applied to the inside of the copper. There are no crooked necks. It is handy any way it is picked up, and is for use anywhere in the shop and on the roof.

As a torch, Sod-Tor-Lite is said to be unusually handy, for the flame can be regulated to any heat ranging to over 3,650 degrees Fahr. It will melt any common metal except platinum, iron or steel, and is just the tool to do all kinds of light brazing and hard soldering. The flame is easily regulated giving a wide range in size adaptable for many classes of work.

By turning the regulator which is conveniently placed at the top of the handle, Sod-Tor-Lite can be instantly turned from a torch to a convenient light.

Trade prices and further particulars will be given upon request. Write to the B. E. Hicken Sod-Tor-Lite Co., Prairie Hill, Mo., for this information and don't forget to mention the American Garage & Auto Dealer when writing.

### "Igni-Test" for Testing the Automobile Ignition System.

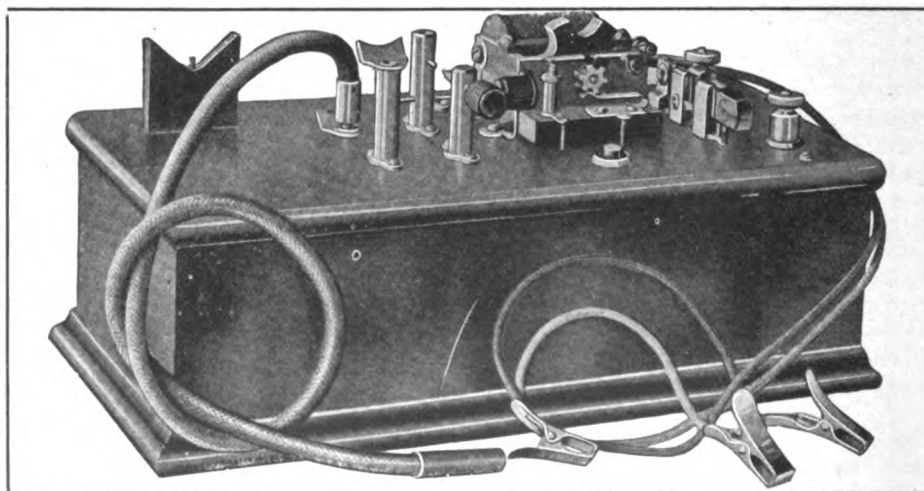
Service without equipment is only a good intention. Why make yourself old by spending hours on what could be done in a minute?

Ignition troubles are the hardest of all automobile troubles to locate. The Testall Electric Mfg. Co. is placing on the market a modern ignition tester—"Igni-test"—which it claims will tell unmistakably just where the troubles lie. This device is good for either magneto or battery systems. It tells the condition of both the winding and the condenser, the distributor, or wiring.

With Igni-test a complete set of charts and wiring diagrams are furnished, with instructions in simple language so that any one should easily learn to locate faults in any ignition system. The instruction book contains diagrams of internal connections of all types of spark coils, and shows if equipped with a condenser and how to connect to correctly test it. The information contained in this instruction book will prove of great value as a reference, not alone to the novice, but to the experienced electrician as well.

Igni-test has no complicated mechanism to confuse the operator and, it is said, it can not be burned out or injured through a wrong connection. It may be operated continuously for many days, if required, from any dry or storage battery, although for all ordinary tests less than a minute's use is enough.

Prices and other information regarding Igni-test may be obtained from the Testall Electric Mfg. Co., San Antonio, Texas.



Igni-test is Claimed to Be Equally Good for Magneto or Battery Systems.



In every bill of goods you buy you get something in addition to the articles itemized in the invoice. You get more or less of *merchandising motion* that is put into them by the *push* of advertising behind them and the *pull* of public favor in front of them.

The biggest *pull* on the standard merchandise in your store is the demand of the hundreds, perhaps thousands, of farmers in your vicinity who buy The Farm Journal.

They learn by it, they farm by it, they live by it, they swear by it, they buy by it.

## The Farm Journal

CHICAGO

PHILADELPHIA

NEW YORK



## The Farm Journal

*Sells Most Goods Because  
Read by Most Farmers*

*Get "chummy" with your Postmaster and find out how many people in your community read general magazines, and how many read farm papers. It will open your eyes to the value of farm paper advertising.*

# Other Side of "Free Air" Question

Discussion of the Free Air Question from the Angle of Service and Development of Business by Manufacturers and Dealers—Arguments Are Presented Showing the Value to Garage Owners of Installation of Free Air Equipment

Readers of the AMERICAN GARAGE & AUTO DEALER do not agree with Felix J. Koch as regards "The Free Air Pest" discussed in his article in last month's issue. The other side of the question of free air is well set forth in three recent communications.

N. Christensen, manager of sales. The U. S. Air Compressor Co., writes:

"In our opinion, an efficient, automatic air compressor that will deliver high pressure air instantly and in the volume required, regardless of the size of tires, is the very best advertisement any garage, tire shop, or gas-filling station could possibly have.

"The average dealer in automobiles, tires, and accessories finds air essential to his own needs and is not purchasing an air compressor solely for 'Free Air' service. The prudent dealer has his free air lines situated at such points that they do not interfere with the patrons who wish to purchase gasoline, oils, or accessories in general.

"Efficient air service is not only the measure which will draw the automobile owner to you, but the one that will help you to retain his trade—and your success depends to a very great extent upon the little courtesies you show your patrons in the way of service you are able to render them. We doubt very much that you could find any advertising medium which would bring you the same returns as your 'Free Air Service.'

"We feel confident that the automobile owners, in general, appreciate the air service you give to them, and in turn, purchase their tires, accessories, gasoline and oils at the places where they obtain their air for inflating their tires. All things being equal, the automobile owner naturally feels obligated to you for this service, and the average man would hardly take advantage of your 'Free Air Service' regularly without giving you some of his patronage. Moreover, do not overlook the fact that every man who drives up to your station for air is a prospective purchaser of something you have to sell.

"On the other hand, if the automobile owner is obliged to pay for this air service, knowing that it can be obtained free at over 99 per cent of the service stations, he would no doubt resent being charged for this service. He would, at least, feel under no obligations to purchase his gasoline, oil, tires, or accessories from you. In fact, a great many of your good customers would feel like going elsewhere to make their purchases.

"We are exclusive manufacturers of two-

stage air compressors especially adapted for garages, tire shops and gas-filling stations where high pressure air service is essential. It is immaterial to us whether the



"Slade, the Tire Man," Believes in Advertising as a Business Producer.

dealer hangs out a 'Free Air' sign or makes a charge for this service, but in view of existing conditions, customers, or prospective customers, expect this air service without charge. We believe that the average dealer will agree with us that efficient air service is not only his best advertisement, but a permanent one."

Robt. I. Erlichman, president, Utilities Sales Corporation, says:

"Although I disagree with Mr. Koch in the main, I must agree with him that the traveling public today is taking undue advantage of a necessary element of service.

"The moment that a thing is paid for, it must be taken out of the element known as 'Service.' To my mind, service should be defined as follows:

"'A something that one pays for without the knowledge of doing it.'

"To cite examples of the ridiculousness of attempting to charge for service would necessitate time and effort, enumerating nearly every responsible establishment in the country, without gaining a greater point than in our preceding definition of the subject."

"Slade—the Tire Man." Automobile necessities—tires, tire sundries, Ithaca, Mich., installed a Romort air and water station some time ago. The other day he wrote the Zinke company, its manufacturer,

giving the free air service idea a very strong indorsement. Here is what he wrote:

"Your Romort air and water station is a wonder. It has already increased my tire, accessory and vulcanizing business to quite some extent.

"As you know, I purchased my Romort air and water station through a jobber in Grand Rapids and asked you for an electrotrope of it so that I could get out some postal advertising of the service which I am rendering the automobile owners of my territory.

"I find that a great many automobile owners who have never done business with me before, stop for air and water. I am positive that the clean, efficient and quick method of dispensing air and water through the Romort air and water station is having effect on the automobile owners who are using this service, for a lot of these owners are now giving me their repair business as well as purchasing their accessories at my store.

"If I could not purchase another Romort air and water station, I would not dispense with the one I now have for twice its price.

"I am a strong believer in advertising that produces results, and your device I feel is the best and cheapest advertising that I could possibly secure."

## For Your Convenience



We have installed at the curb in front of our store this Free Air and Water Station.

We want you to use it and believe you will find it real convenient when your tires need inflating or your radiator needs filling.

The business end of it is always on the job.

24 hours a day—7 days a week you'll find our air pressure strong

Try it some morning about 2 a. m. and see for yourself.

Our stock of Automobile Necessities is complete.

**SLADE--The Tire Man**  
"VULCANIZING THAT PAYS"  
First Door South of Seaver House

Postal Advertising Which Brought Results.



# Sell En-ar-co Motor Oil

## *Read These Reasons Why*

**T**EN years ago motorists knew little about motor oils. Of course they knew there were differences. What these differences were and how they affected motor car performance few, however, appreciated.

Motor car manufacturers through publicity and their salesmen did much to educate car owners. So did leading oil companies. Many car owners learned by experience.

As motorists learned to distinguish differences between oils, En-ar-co superiority was quickly recognized. No more convincing proof of this could be given than the fact that since 1910 En-ar-co sales have increased 400 per cent.

We have in our files more than a hundred thousand signed statements testifying to En-ar-co unvarying high quality.

## Nationally Advertised

Nor do we stop at the production of this better lubricating oil. We tell our story of Scientific Refining and what it means to motor car owners in convincing full page advertisements appearing monthly in the nation's leading farm papers.

These advertisements are read by nearly three million oil users. Each month we receive thousands of requests for the FREE En-ar-co game featured in our advertising.

We supply each dealer with a quantity of these games for distribution. He sends us a list of the automobile owners in his locality. To these owners we write letters urging

them to call at this dealer's store for a free game. Thus we are constantly bringing new En-ar-co prospects into our dealers' stores.

## Get the Plan Today

These are but a few of the reasons why YOU want to sell En-ar-co Motor Oil, and other En-ar-co products—White Rose Gasoline, National Light Oil, En-ar-co Motor Grease, Black Beauty Axle Grease. All excel as does En-ar-co Motor Oil. Write us today for full details in regard to our dealer plan.

THE NATIONAL  
REFINING CO.  
2089 Rose Bldg.  
Cleveland, Ohio

Gentlemen: Please send me full detailed information as to your dealer plan and advertising helps.

**THE NATIONAL REFINING COMPANY**  
2089 Rose Building Cleveland, Ohio

Name.....  
Address.....  
City..... State.....  
I now sell.....oil

# News of Manufacturers and Jobbers

## Beckley-Ralston Offers Unusual 500-page Catalog to Trade.

For 25 years the Beckley-Ralston Co. has been serving dealers. It is distinctly a dealers' house, selling at wholesale only. Today it is making a most unusual offer to its patrons—a copy of its big 1920 500-page catalog free of charge.

This new book, which is attractively bound in cloth, is an encyclopedic of dependable motor goods. In an interesting manner over 4,000 items, including complete Ford equipment, parts, replacements, automobile accessories of all kinds, garage equipment, hand and power tools, are described. It is a wonderful book to own—to draw from for a source of supplies.

A product of particular interest, which is described on page 64 of the catalog, is the B-R Master hydrometer for testing acid solution in storage batteries. Here is an innovation in storage battery testers. The float is protected by celluloid rings with projections which serve as guides, holding the hydrometer upright in the test tube and overcoming any tendency to stick. As everyone who has had experience with hydrometers knows, it is sometimes very difficult to secure a correct reading when the float tips against the glass barrel and is held there by capillary attraction, which interferes with its free action.

The test tube or glass barrel is large and the float scale is said to be easily read. It is protected by soft rubber rings in case of accidental droppage. The tip is made of hard rubber and the manufacturer guarantees that it is not affected by the action of the electrolyte. Every float is tested for accuracy. The Master hydrometer comes packed in a wooden case with complete instructions.

In order to obtain the Beckley-Ralston 1920 catalog, send your name and address to the Beckley-Ralston Co., 1801 South Michigan Ave., Chicago. State whether you are an accessory dealer, service station owner, garage owner or jobber. There is no obligation. But—don't forget to mention the American Garage & Auto Dealer when writing for your copy.

## Screen Actress Demonstrates Value of Alemite Lubricating System.

One of those who take great delight in teaching the ease and positive lubrication that can be obtained through the use of the Alemite high pressure lubrication system is Miss Virginia Lee Corbin, America's leading child screen actress.

Little Miss Corbin, who is a tiny creature of 3 feet 4 inches in height, with light flowing hair and blue eyes, began

her career as an artist's model. For a period of eight months she played with the Lasky Film Co. and later joined Universal in a series of pictures which were written exclusively for her. Her other connections were with Metro and Balboa companies. At present she is connected with the Fox Film Co. in Los Angeles, where she is taking the leading part in many popular child plays.

The Alemite lubricator consists of a cylinder which is made of 16-gage steel,



Screen Actress Operating the Alemite.

knurled to prevent turning in the hand. Attached to this cylinder is a 15-inch flexible steel hose terminating in a bayonet coupling. This complete outfit is loaded with grease and ready for instant use, and can be conveniently carried in a tool box. For lubricating each part of the car, the manufacturer of the Alemite lubricator guarantees that the device will prove most valuable.

Ball-check valve nipples, both straight and elbow, are furnished in the size required by the type of car.

Trade prices and more detailed information concerning the Alemite lubricating equipment will be furnished on request. Write to the Bassick Mfg. Co., 361 West Superior St., Chicago, Ill., for further particulars, and don't forget to mention the American Garage & Auto Dealer when writing.

## Death of Max D. Bendell, Manager of Twitchell Gauge Co.

The many friends of Max D. Bendell, manager of the Twitchell Gauge Co., of Chicago, will be shocked to learn of his death from heart failure at Chicago on

May 7. Mr. Bendell, was stricken just as he had alighted on the suburban train on his way to business.

Mr. Bendell succeeded to the management of the Twitchell Gauge Co. in 1912, shortly after the company was acquired by A. Schrader's Son, Inc., of Brooklyn, N. Y. In addition to his duties as sales executive of the Twitchell Gauge Co., he also conducted the Chicago branch of the Schrader company. He was highly successful as a salesman and the rapid expansion of the Twitchell business was in a great measure due to his aggressive personality and enthusiasm.

## Champion Spark-Plug Jobbers Solve Freight and Express Embargo.

Due to the embargo on freight and express shipments, the Champion Spark-Plug Co., of Toledo, Ohio, was in the same predicament recently as thousands of other manufacturers, and the wires were kept hot by a number of jobbers who were in urgent need of plugs for their trade.

It happened that the sales force of two prominent New York jobbing houses, the A. J. Picard Co., and Whittemore-Sims Co., were in Toledo at the time when the freight tie-up was at its worst. These men had been invited to Toledo as guests of the spark-plug company for the express purpose of seeing how Champion spark-plugs are made.

While going through the plant, they noticed the congestion of freight in the shipping department—one keen-eyed salesman pointing out a case of plugs with his firm's name stenciled on it. As a joke, he suggested that they carry the case back with them and was given the laugh by the crowd when told that the box weighed over 600 pounds.

Then he proceeded to prove himself a salesman by convincing his boss that the idea was a practical one. He argued that if each man would carry his share, they could take the entire 2,500 plugs back with them. In the end, he won his point. When the delegation left for home that night, each man carried at least one package containing 100 Champion spark-plugs.

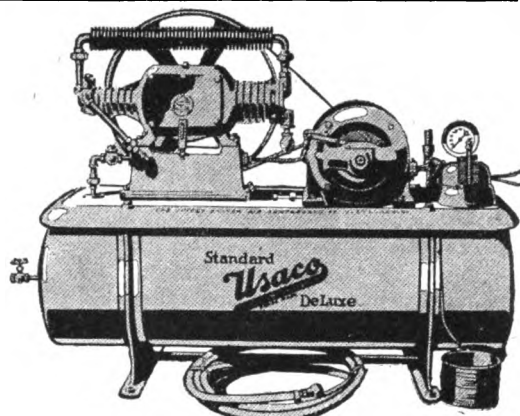
## Lockwood Mfg. Co. to Produce Automobile Fabric Accessories.

The auto accessories division of the Baker & Lockwood Mfg. Co. has been purchased outright by the Lockwood interests and hereafter will be operated as a separate institution known as the Lockwood Mfg. Co. Automobile fabric accessories exclusively will be made. The entire plant in Kansas City, Mo., has been taken over and the Brooklyn factory and Chicago distributing branch will be maintained.



# ***You want*** *"Quality Remains Long After Price Is Forgotten"*

High pressure air in  
great volume—  
automatic operation—  
low operating and  
upkeep cost



The Usaco Standard De Luxe, capacity 4 cu. ft. per minute. Has 30 gallon tank tested to 400 pounds and suitable for a working pressure of 200 pounds. A completely automatic unit of the highest quality. Furnishes high pressure air in great volume for tires of all sizes and pressures and is quiet running and foolproof. Also furnished with 60 gallon tank or with wheels to provide portability.

## ***You obtain these features and more***

in the purchase of Usaco Two Stage Air Compressors.

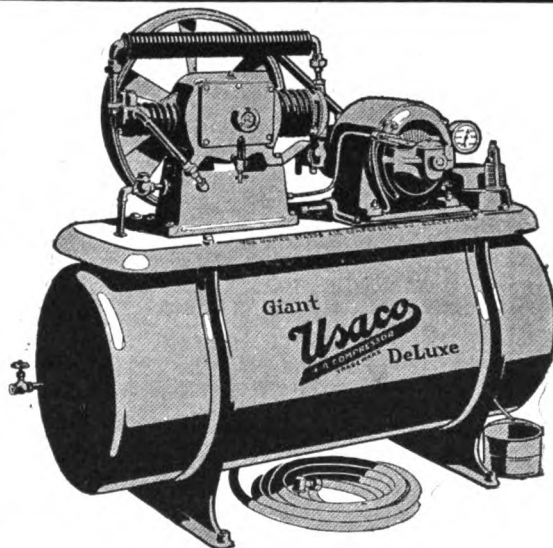
These units combine the fundamentals of successful operation together with many exclusive refinements, making withal, the greatest air compressor values obtainable.

To most people who study the mechanical design and operating principle of Usaco compressors the reasons for their superiority become at once apparent; and to investigate them from the user's standpoint generally means to become doubly assured of their uncommon merit.

The man considering the purchase of an air compressor owes it to himself to weigh all the information available that will enable him to make the proper selection. In view of present gruelling service which an air compressor must encounter, such an investigation is absolutely essential.

We welcome the most searching examination and the severest tests known, realizing that the more thoroughly you investigate Usaco compressors, the more assuredly you will be convinced regarding their incomparable quality.

*Write today for Usaco literature.*



The Usaco Giant De Luxe, capacity 7 cu. ft. per minute. Has 60 gallon tank tested to 500 pounds and suitable for working pressure of 250 pounds. Of the same general design as the Standard but with greater capacity, having a more powerful motor and a tank with double the capacity. Particularly adapted for the gruelling service encountered in inflating giant truck tires, a service which it handles with gratifying speed and ability. Also furnished in portable form.

## ***To Assure Satisfaction Purchase***

# **Two Stage *Usaco* Air Compressors**

*Manufactured by*

**The United States  
Air Compressor Co.**

5308 Harvard Ave.

CLEVELAND, OHIO

In writing for literature and prices mention the name of your Jobber.

Inquiries desired regarding our plan of cooperating with Jobbers.

Please send literature advertised in American Garage and Auto Dealer to name written on margin. My Jobber is .....

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

The complete 50-page catalog of the Lockwood company describes its products which include slip covers or seat covers made of carefully selected fabrics; dust hoods and kick pads, driver's cushions, carpets, tire covers, etc., guaranteed by the manufacturer to be A No. 1 in material, design and workmanship.

Copies of the catalog will be sent to all dealers who are interested. They will find it well illustrated, practical and interesting. The address is Lockwood Mfg. Co., 7th and Wyandotte Sts., Kansas City, Mo. Mention the American Garage & Auto Dealer when writing for copies.

### Jobbers Offer Prompt Delivery on Spencer Axle Shafts.

During the past year the shortage of replacement parts has been an increasing source of embarrassment to the car dealer. With output facilities taxed to the limit, by the unprecedented demand for new cars, the manufacturer is unable to offer much promise of relief.

In this emergency, dealers are turning to the jobber and find that he is ready to give



Where Spencer Axle Shafts Are Made.

them prompt delivery on many parts on which they have been experiencing long delays. For instance, leading jobbers carry a complete line of Spencer axle shafts, drive shafts and other replacement parts, which are guaranteed to be at least as good quality as the ones they replace. In furnishing parts thus guaranteed, the dealer can feel ample assurance that he is doing the right thing by his customers in the way of quality as well as giving them the benefit of quicker service than is otherwise possible under present conditions.

### Federal Court Upholds Cork Insert Patent in Recent Decision.

A patent case of unusual interest to the trade was recently decided by Judge Tuttle in the federal court at Detroit. After a complete hearing and argument in the case of Advance Automobile Accessories Corp., of Chicago, vs. Howard K. Ford Mfg. Co., of Coldwater, Mich., Judge Tuttle rendered a decision holding the cork insert patent, under which Advance cork insert transmission and brake lining for Ford cars is manufactured and sold, valid; and that the Ford cork set transmission lining made by the defendant in this case was an infringement of the cork insert patent.

The Advance Automobile Accessories Corp. set up as one of its claims to this

suit that the imitation cork insert linings being offered to the trade were far inferior to the genuine product and did not give good results when put into use, and consequently damaged the reputation of genuine Advance cork insert with the trade and the public.

The Advance Automobile Accessories Corp. reports that it is its belief that only a comparatively small amount of the imitation and infringing cork insert linings was handled by the legitimate jobbing trade as the Advance company took every precaution to protect the jobbers from liability to suits for damages and profits by sending out repeated notices to the trade of the infringing nature of the imitation linings, and calling its attention to the suit then pending.

### Production of Sheridan Car Expected to Begin in August.

Announcement is made that the Sheridan Motor Car Co., a newly created division of the General Motors Corp., will manufacture the Sheridan car at Muncie, Ind. D. A. Burke, formerly in charge of the Buick Motor Co's. business in Chicago, and who, previous to that, had held several other official positions with the Buick organization, is president of the new General Motors division.

The latter has purchased and greatly improved the plant at Muncie, formerly used by the Inter-State Automobile Co. This plant, now one of the best arranged and equipped in the country, has a possible output of 300 cars per day, with sufficient vacant property around it to permit the growth that is anticipated. The new Sheridan, production of which is expected to begin in August, will be made in two sizes, four and eight cylinders. Each will be manufactured in roadster, touring, coupe and sedan models. Further announcements with respect to the details of the car will be made in the near future.

Mr. Burke's long contact with the automobile trade and car-buying public gave him definite ideas and ideals which he has incorporated in the Sheridan, and the few who have been permitted to see it declare that his product is a splendid combination of refinements that will surely command favorable attention when placed on view. The new car is his creation, working with the General Motor's engineers, and is said to be a masterpiece in design, stability and completeness.

### Federal Electric Co. Moves From Its Old Quarters to New Plant.

Increased business has made it necessary for the Federal Electric Co., of Chicago, to move from its quarters at Lake and Desplaines Sts., one of the most congested sections of the city, to its new plant at 87th and State Sts.

The new building was constructed with the view of effecting the greatest economy

in production. All the manufacturing will be done on the ground floor. The new location will permit the creation of baseball and tennis grounds which will give the company's employees opportunities for recreation.

Among the products manufactured by the Federal Electric Co. are electric signs, dishwashers, washing machines, fuses, sirens, vacuum cleaners, electric lanterns, porcelain sockets and bushings.

### Automotive Equipment Jobbing House Opens in Birmingham.

It is announced that the Mayberry Automotive Equipment Co. has opened in Birmingham, Ala., under the management of T. W. Mayberry. This company will distribute a full line of automobile supplies and garage equipment to the automobile dealers and garages throughout Alabama, Mississippi and Georgia, conducting a strictly wholesale business and carrying a large and well assorted stock.

### Truck Construction and Operation Studied by F. W. D. Employees.

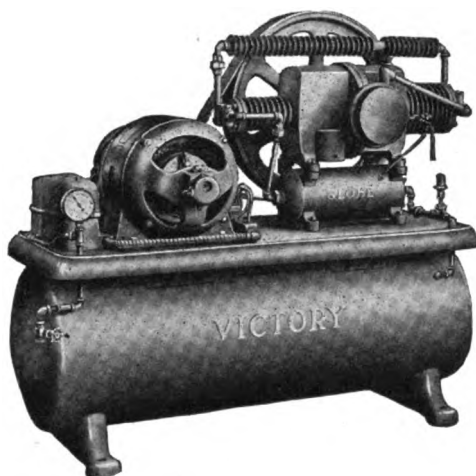
A plan to increase the efficiency of its service to users of its product has been inaugurated by officials of the Four Wheel Drive Auto Co., Clintonville, Wis., by enlarging the scope of the school of instruction conducted at its factory, to include every male employee in its office, regardless of the nature of his work.

It is the opinion of executives of the company that an individual understanding of the principles of construction and a knowledge of the various parts used in the makeup of the truck, will expedite the work of each department in its relation with other departments, to the ultimate benefit of its users.

Employees taking the course are paid on the same basis as when doing their regular work. Each class is of three weeks' duration, during which time every part of the truck from the principles of construction, types of driving, gear ratios and other essential points, are thoroughly mastered. Every student must do the actual work himself, of fitting each unit on the chassis in assembling a complete truck. Severe examinations follow the completion of the course.

### Paragraphs.

THE DENBY MOTOR TRUCK CO. announces that its general sales manager, L. B. Graham, is on an extended trip calling on Denby distributors and dealers. Distributing centers such as New York, Philadelphia, Nashville, St. Louis, Dallas and other points are reporting a tremendous demand for Denby trucks. Mr. Graham is now on his way to the Pacific Coast to confer with the Denby district managers who are reporting a wonderful outlook for the motor truck business.



**"VICTORY" Complete Automatic  
Motor Drive Unit**

# **GLOBE AIR SERVICE**

## **your best advertisement**

A first class air service is the most effective and profitable form of advertising that you can use. Any motorist prefers to stop at a garage where his tires are inflated promptly and properly. Your air service is your first point of contact with a large number of car owners. If the service is prompt and dependable, a favorable impression is made—resulting in profitable business.

When you install a GLOBE outfit you are certain of giving an air service which cannot be excelled—and which will prove a big factor in building your business.

The Globe manufacturers made the first two-stage air compressors, setting a standard that has never been equalled.

Globe Air Compressors meet all the requirements of garage service. They provide ample pressure and capacity for inflating the largest pneumatic truck tires. As these tires are daily becoming more numerous, you realize the need of being able to give them service. Globe Air Compressors are noted for their low operating cost and great durability, as well as the dependable service they always render.

*Write Department A-G for Bulletin.*

## **GLOBE MFG. COMPANY**

**Battle Creek, Mich., U. S. A.**

# **GLOBE**

## ***Air Compressors***

### Belting Helps for Repair Shop.

(Continued from page 23.)

total will be the required length of the belt required for the purpose.

Example: Squaring the diameter of the large pulley and the distance between centers, we have 11,520, and the square root of 11,520 is 107.33. The square of the diameter of the small pulley plus the square of the distance between centers gives us 9,280, the square root of which is 96.33. The sum of these two square roots, 107.33 plus 96.33, is 203.66. This, plus one-half the circumferences of the pulleys (circumference = diameter  $\times$  3.1416) 75.398 and 12.561, respectively, gives us 291.61 inches, or the total length of the belt, which is to be used crossed instead of straight on the pulleys as shown in Fig. 4.

In case both pulleys are about the same size, add the diameters of the two pulleys together, multiply this result by 3.1416, and divide by 2. To this quotient, add twice the distance between centers of the shaft and this will be very close to the required length of the belt.

Should it be necessary to ascertain the belt speed in feet per minute, the following rule will answer very nicely:

Multiply the diameter of the pulley in inches by 3.1416 and again by the number of revolutions per minute of the pulley and divide by 12. This will give feet per minute traveled by the belt.

To find the horsepower, a certain belt will transmit when pulleys are somewhere the same size and no idlers are used, the following rule, which applies to single belts only, will give very satisfactory results:

Multiply the belt speed in feet (found by

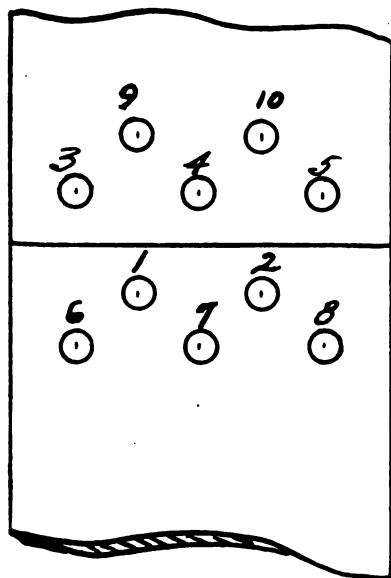


Fig. 5—Double Row of Holes for Strength.

the rule just given) by width of the belt in inches and multiply the result by 55. Divide the product found by 33,000. The quotient will be the amount of horse-power that any good single belting will transmit

with safety. In case the belt is double-ply, multiply the horsepower found by 1.6 or for triple-ply belting multiply by 2.

Quite often it is necessary to know the width of a belt required to transmit a certain horsepower. A rule which can be applied to problems of this nature is as follows:

Multiply the given horsepower by 33,000 and divide the product by the result obtained by multiplying the belt speed in feet per minute by 55 for single-ply and by 88 for double-ply, or by 110 for three-ply. The quotient will be the width of the belt required. This rule will apply on pulleys covered by the belt, about 180 degrees.

There are but two principal methods of joining belts—the butt and the lap joint. In the butt joints, the belt is either laced with metal or leather. The leather, however, preferred by many makes a very flexible joint. Many, however, like the metal fastener of which many different kinds may be had.

In lacing with leather, judgment must be used in punching the holes to get a splice that will be as strong as the remainder of the belt. This is accomplished by using one or more rows of holes, as the case may be. In case the work is heavy and the power to be transmitted is more than a single row of holes will stand, a double row may be placed as shown in Fig. 5.

For belts from 2½ inches wide and over, these holes are made in the following manner: 1, 2, and 3, 4, 5, about ⅝-inch from the end of the butt, 6, 7, 8, being about ⅜-inch behind 1, and 2, while 9 and 10 are about ½-inch behind 3, 4, 5, respectively. If the belts are thinner, the holes may be a trifle closer together and to the edges of the belt, the exact distances permissible being closer to each other as the duty lightens.

No matter how narrow the belt (unless round), there should be at least two holes at each butt. The size of the holes should also be taken into consideration, for a large hole in the small, narrow belt only tends to weaken it at that point; on the other hand, a small hole in a large, wide belt will not permit of a sufficiently large lace being used to equal the strength of the remainder of the belt.

The following size holes will be found about right in practice: Belts, up to 3½ inches, punch ¼-inch holes; belts, 3½ to 8 inches, punch holes not larger than 5-16 inches; belts, 8 to 12 inches, punch ⅜-inch holes; belts, 20 inches and up, punch holes 7-16-inch. The holes are usually round when cut, but after a time they assume an oblong shape from the constant pull. Some however, prefer to punch an oblong hole in the beginning but there is little to be gained by so doing.

One of the things to be looked to, first of all, is to see that the ends of the belt are cut absolutely square so that when the lacing is drawn, the belt will be perfectly

straight. The width of lace leather necessary for the different widths, will be an important consideration at this time. Should a narrow lace be used on a wide belt, it would have a tendency to stretch more

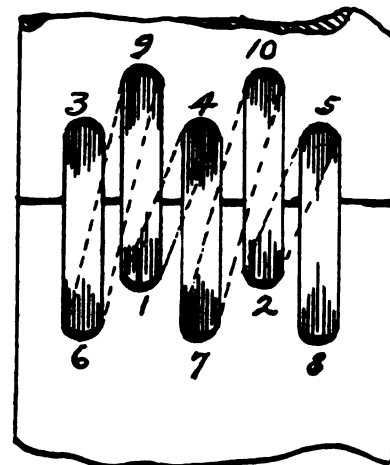


Fig. 6—A Simple Lacing Method.

than the heavier one. Even though more laces are used, it is impossible to make them sufficiently snug so that there will be only a certain amount of stretch.

The width of lace for the different widths of belting will run about as follows: 1 to 2 inches, use lace ¼-inch wide; 2 to 4 inches, use lace 5-16-inch wide; 4½ to 8 inches, use lace ⅜-inch wide, and 8 to 20 inches, use lace ½-inch wide.

After a time of constant use, the belt will, in all probability, stretch, until it will be necessary to shorten it to overcome the slack. When shortening, it is a very good plan to examine closely and cut the end showing the most irregularity in the holes.

There are many different methods of lacing belts, but that here described gives very good service and is very simple. Place the lace through the holes 7, 4 (Fig. 6), having the ends of equal length and emerging on the side that is to be, when finished, the outside of the belt. It will be readily seen that each lace thereafter works to the outside edge of the belt. The dotted line showing the path of the crossed lace. After the lace is finished, the two ends may be tied or an extra couple of holes may be punched back of 4 and 7, and the lace finished on the outside of the belt. It will be noted that in this method of lacing, all laces cross on the outer side of the belt, leaving the lace next to the pulley, running parallel with the belt. By placing the lace in this fashion, the friction on the face of the pulley face is much greater than it would be if the crossed side were run next to the pulley.

A lap joint is one in which the two ends are chamfered, one overlapping the other for four or more inches, depending on the width of the belt. This joint may be either cement or riveted, or both, as the case may be.

The advantage in rivets lies simply in



# Soap is Cheaper than Paint

*—if only the right kind of  
soap is used for the auto*

**I**T takes just about one application of the wrong kind of soap to send the auto on a premature visit to the paint shop. And premature visits come high.

The owner of the auto little realizes the enormous amount of time and expense required to build up the high finish on the auto body. Yet it is a matter of pride to him to exhibit this beautiful finish as he drives about the streets and boulevards.

So when the car gets dirty and dusty, he is apt to use an ordinary soap, thinking that by so doing he can not only clean it quickly but also bring back the original lustre.

The soap takes off the grease and dirt, but the costly polish comes off too. And a bill for repainting and refinishing is in prospect.

## BUCKEYE CLEANSER

overcomes all the objections to the common soaps and cleansers. It is as harmless as clear water. And yet it is wonderfully effective in taking off the dirt and grease.

Buckeye Cleanser acts as a solvent for grease and grime, carrying it off in rich, creamy suds. At the same time it gives a glow to the finish, restores the lustre, and prolongs the life of the original polish.

Fifteen years of use under all kinds of conditions has removed from Buckeye Cleanser the stigma of being an experiment, and placed upon it the stamp of approval of thousands of drivers, garage owners and accessory dealers.

*Buckeye Cleanser is sold by accessory and hardware dealers whose reputation has been built up for handling only quality goods. Most jobbers carry it in stock.*

## The Davies-Young Soap Co.

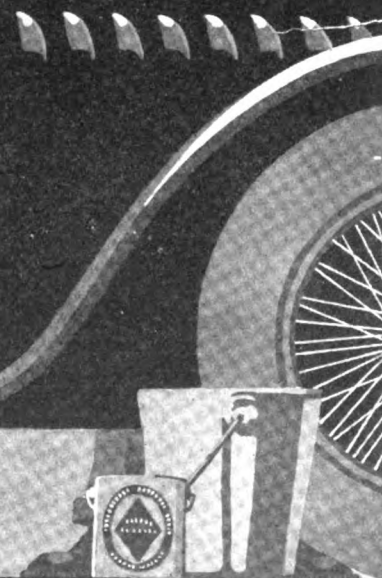
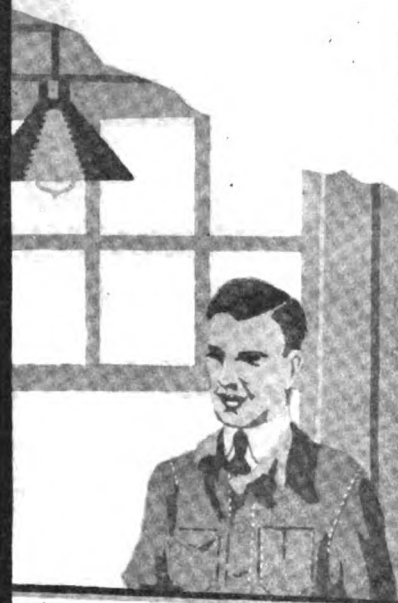
Dayton, Ohio

*Coast Sales Agents:*  
Allied Industries, Inc.  
San Francisco  
Los Angeles Seattle

*Denver Sales Agents:*  
Paramount Lubricants Co.  
Denver, Colorado

*Southern Sales Agents:*  
The Colley-Minnich Co.  
Atlanta, Georgia

**BUCKEYE** THE AUTO SOAP THAT  
**CLEANSER** CLEANS & POLISHES



# APCO Equipment for FORDS

## Stop that rattling Steering Wheel on Your Ford

The steering column brace eliminates all vibration of the wheel and holds it solid. Other cars use one - *Fords Need It.*

Sold by dealers everywhere, or prepaid on receipt of price.

Apco Mfg. Co., Providence



## Puts Your Ford Horn where you can reach it.

It is attached to the throttle or gas lever where it is under the driver's finger at all times.

**APCO Horn Button**  
consists of button, bracket and wire  
Sold by dealers everywhere, or prepaid on receipt of price  
Apco Mfg. Co., Providence, R. I.

## Does Your Ford Wander off the Road?

### FRONT AXLE BRACE

Holds axle firmly in position, reinforces front radius rod preventing bending and breaking. Stabilizes the whole front of your car.

At your dealer or send his name with your order direct to  
Apco Mfg. Co., Providence, R. I.



Also made in Angle Steel - \$1.50

## Hitting on all Four

The testing valve in the new

### APCO MUFFLER

tells you at once and finds the skip if there is one. It can't explode, loosen or rattle and is designed to muffle the exhaust without back pressure.

At your dealers or if not sent direct on receipt of price.

APCO MFG. CO. PROV. R. I.

\$5 COMPLETE

MAKES YOUR  
FORD  
MORE CAR

## Is Your Ford Full of Rattles?



STOP this source of annoyance and danger at once with—

### APCO Anti-Rattlers

Heavy springs automatically take up the wear Radius Rod 1 in a box 50c ea. Steering Rod 2 in a box 50c pr.

At your dealers or send his name with your order direct to  
APCO MFG. CO.  
Providence, 2

Send for Our Catalog  
and Price Lists

**APCO MFG. COMPANY**  
Providence, R. I.

the fact that they are easily applied and can be used when there is not time for gluing. In riveting, the holes should fit the rivets snugly, so that there will be no chance for shifting, and the heads of the rivets should run next to the pulley. Many prefer to glue the belt after which it is pierced with an awl and pegged with wooden pegs, such as were used extensively at one time by shoemakers. This method has its advantage, inasmuch as none of the leather is removed and the belt is therefore stronger.

## Welding, Cutting and Brazing Practice.

(Concluded from page 25.)

piece of hickory or other hardwood, providing he does this before the solder congeals too much. The metal should be in a mushy state when the smoothing is attempted.

When the work is finished, the casting should be allowed to remain in a horizontal position until the joint is almost cold or, at least, until it is certain that the solder has set hard. Then there will be no chance of loosening the bond.

The metals used in most aluminum solders are more or less electronegative to aluminum. Therefore, a soldered joint is more or less rapidly attacked by water or moist air, and the joint may become completely disintegrated in a comparatively short time.

To overcome this action it is advisable to cover the joint with a coat of heavy varnish or, at least, a coat of aluminum paint. Both the soldered joint and the surrounding metal should be coated. This covering protects the solder from the action of moist air or water. On jobs like the oil pan, this corrosive action is not so pronounced as on thin articles, such as utensils, and may, therefore, be overlooked to some extent.

The appearance of the soldering when completed, with the surplus metal rounded over smoothly and polished with the hickory is shown in Fig. 3.

In applying this process to other articles than automobile work, the fundamental principles are the same: Clean and tin with solder the parts to be joined, then melt the solder on the tinned part.

Three other formulae for aluminum solder which may be made by the average mechanic about as has been described are:

|                    |               |
|--------------------|---------------|
| Zinc .....         | 8 per cent    |
| Tin .....          | 78 per cent   |
| Aluminum .....     | 9 per cent    |
| Cadmium .....      | 5 per cent    |
| Zinc .....         | 9 per cent    |
| Tin .....          | 86 per cent   |
| Aluminum .....     | 5 per cent    |
| Phosphorous .....  | 0.25 per cent |
| Zinc .....         | 21 per cent   |
| Tin .....          | 73 per cent   |
| Lead .....         | 5 per cent    |
| Phosphor-tin ..... | 1 per cent    |

## The Largest Garage in the World.

By FRANK E. MORRIS.

Mgr. Quick Tire Service Co., Dallas, Tex.

Men dream dreams, and the dreams come to fruition, some time, somewhere.

Recently the Dallas Automobile Club

Just a line to show my appreciation of the "American Garage & Auto Dealer."

I don't believe anyone could put the case of the tire dealer as clearly as it is stated in the articles, "Selling Tires at a Discount," and "Facts and Ideas for the Tire Dealer," in your May issue. In fact, I thought so much of it that I cut the pages out and sent them to one of the "Big Five."

It's exactly what is happening everywhere today, and if something is not done soon to stop it, it will spoil the business entirely. When a man starts cutting prices he usually has to keep it up and although he may do more business, he is no better off than if he was on the square and took his fair profit.

A man came into my office this morning and asked the price of a tire. I told him and also added that there was a 5 per cent war tax. He said: "Why, I can buy them at 10 per cent off list, to say nothing of a war tax." Sufficient to say that I did not sell him.

It's about time the manufacturers were doing something about it, but I don't suppose they care as long as they sell the tires.

Well, I've said enough, but I wish you would send me another copy of the May issue. It will come in mighty handy in case of an argument.

Each issue is worth a year's subscription price.

Paul Perkins, Proprietor,  
Kenosha, Wis. The Tire Shop.

passed a resolution to the effect that Dallas, like all cities is growing so fast that traffic would soon be an unsolvable problem, in view of the increased use of the automobile.

It was the sense of this resolution that the Dallas streets were already overcrowded, and that the congestion was not only causing great losses, but to it was due the loss of life and property.

The club then passed a motion that Dallas and outside capital be invited to construct automobile garages in Dallas that would have large capacity, and aid in relieving the congestion. It was suggested that the sky be the limit for upward construction.

Already two Dallas men have leased ground, and made plans to construct such garages. Both of these are planned to have individual parking space, so arranged that a car can get out, no matter if there are seven or 700 cars inside. These two if completed will have a capacity of 700 cars. One has decided to have an auto-

# The Trend in Spring Buying

**A**UTOMOBILE owners are fast coming to realize the need of care in replacing springs. They want springs that afford real comfort, springs they can depend upon in every emergency.

When you sell the Harvey Spring you sell highest quality and insurance in one, effecting an eventual saving for the purchaser and protecting him and yourself by the broad Harvey guarantee.

The Harvey Spring offers the utmost in riding comfort, strength and endurance.

The severe tests to which every Harvey Spring is put before it can become a part of the motor car insure this super spring bearing up under most unusual emergencies—conditions which ordinary springs could not withstand. This is because the Harvey Spring is manufactured to the highest possible standards—heat treated and tempered accurately and uniformly by the Harvey patented process, and made boltless.

*Harvey dealers also enjoy generous factory co-operation. Write for book giving specifications for more than 1500 kinds of Harvey Springs.*

## HARVEY SPRING & FORGING CO.

1046 17th Street  
Racine, Wis.



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

mobile laundry business in connection, where cars can be vacuum-cleaned, washed, dried and polished, in short order, at reasonable prices; also a ladies' waiting and rest room, with a maid in attendance, where

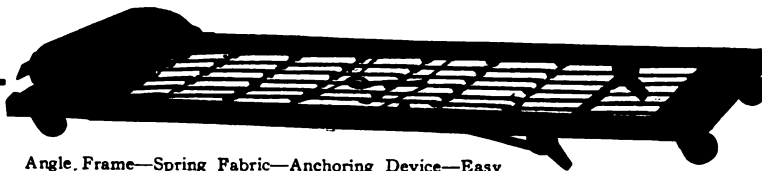
shoppers can have their packages checked until ready to go in their car.

On top of all this comes the proposal from an outside man to construct a 1,000-car-capacity garage, with all conveniences.

Of course, the Dallas Automobile Club cannot foster or father any of these legitimate movements or promotions, but it is watching and waiting to see who will build the largest garage in the world.

# Foster

**Auto Repair Creeper**  
ALL-METAL CONSTRUCTION



Angle, Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

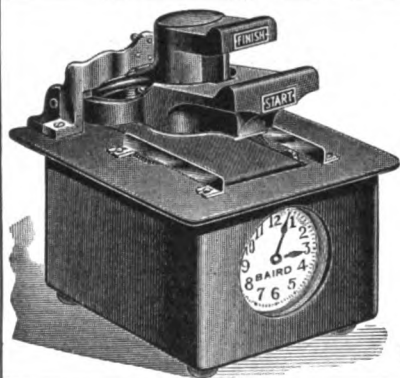
**FOSTER BROS. MFG. CO., UTICA, N. Y., U. S. A.**

**\$5.00**

Ask for the name of the Foster distributor in your territory.

**DIRECT REPRESENTATIVES**  
Eastern and Southern States: Asch & Co., 16-24 W. 61st St., New York, N. Y. For the Mid-West: Jessop & Thompson, 1421 S. Michigan Ave., Chicago, Ill. Pacific Coast & Inter-mountain Territory: McDonald & Linforth, 739 Call Bldg., San Francisco, Cal.

**Put your repair charges on a profitable basis with**



## BAIRD TIMING DEVICES

Keep a check on your employees' time and learn exactly what each job costs. Automatic supervision turns losses into profits.

Prices moderate.  
Write today for booklet.

**Baird Equipment Co.**  
324 W. Ohio St., Chicago  
Phone Superior 2071

## HOLD 'EM IN THE ROAD

Gives the Ford driver better control over his car, preventing breakage, repairs and accidents.

Combines four valuable attachments in one—Radius Rod Brace, Anti-Rattler, Axle Support and Steering Device.

**DEALERS**—This is the most essential of all Ford necessities. Ask your jobber or write for particulars.

**CASCO MFG. CO.**

**THOMASVILLE, GA.**

Other "CASCO" Products

"CASCO" Fan Belt Guide

"CASCO" Oil Drain Cock

"CASCO" Ford Coil Box Protector

## Grind Crankshafts IN ONE HOUR

Don't attempt to scrape a bearing to crank pin that has worn oval and don't pay a machine shop \$15 or \$25 for a lathe job. Get the extra profits yourself. Send for an

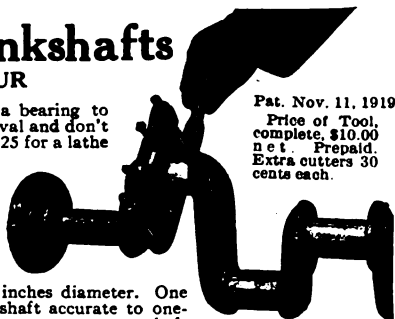
**Atlas Abrasive Tool**

and do the work easily, by hand, right in your own shop without machinery of any kind. Adjustable to crank pins from 1 1/4 to 2 1/2 inches diameter. One hour completes the entire shaft accurate to one-thousandth. Not even necessary to remove shaft from crankcase. Use the same old bearings. The Atlas Tool removes just enough to true up bearing, making rebabbiting unnecessary. 3000 satisfied users. Get yours now. **WIRE YOUR ORDER TODAY.**

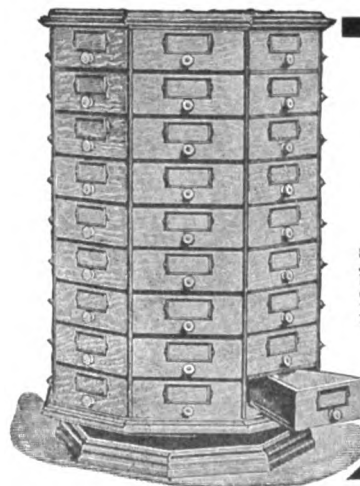
**ATLAS MANUFACTURING COMPANY**

702 N. Canal St.

Pittsburgh, Pa.



Pat. Nov. 11, 1919  
Price of Tool, complete, \$10.00 net. Prepaid. Extra cutters 30 cents each.

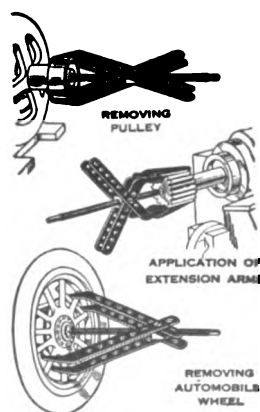


## Keep your supplies in revolving cabinets like these

Systematic! Conveniently Accessible! Just like "rolling off a log" to look up bolts, screws, etc., with this revolving cabinet. Everything at your finger tips, with nothing to burden your memory. Used by leading garages of this country.

Buy today from your jobber.  
Catalogue on request.

**American Bolt & Screw Case Co.**  
DAYTON, OHIO



## "LITTLE GIANT" GEAR AND WHEEL PULLER

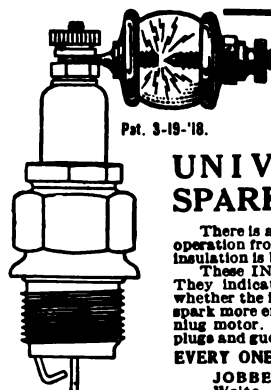
Pulls any gear, wheel or pulley anywhere in a jiffy. Built on the only correct principle. Produces maximum efficiency with minimum effort. Can't twist off or let go. **THE HARDER THE PULL—THE TIGHTER THE GRIP.** Reduces operating cost and increases the earning capacity of any Repair Shop. Made from best grade drop forge steel. Almost unbreakable. Satisfaction guaranteed or money refunded. Order or write for details today. Price complete with extension arms, \$12.00.

Liberal Discounts to Dealers.

**Premier Motor Products Co.**

3954 North Robey Street

Chicago, U. S. A.



Pat. 3-19-'18.

## Spark Plug Troubles Are Rare Occurrences

on the car equipped with

## UNIVERSAL or MARVEL SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken, or a plug fouled with grease or carbon.

These INTENSIFIERS will make such plugs fire perfectly. They indicate instantly whether a cylinder is misfiring and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is misfiring.

**EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM**

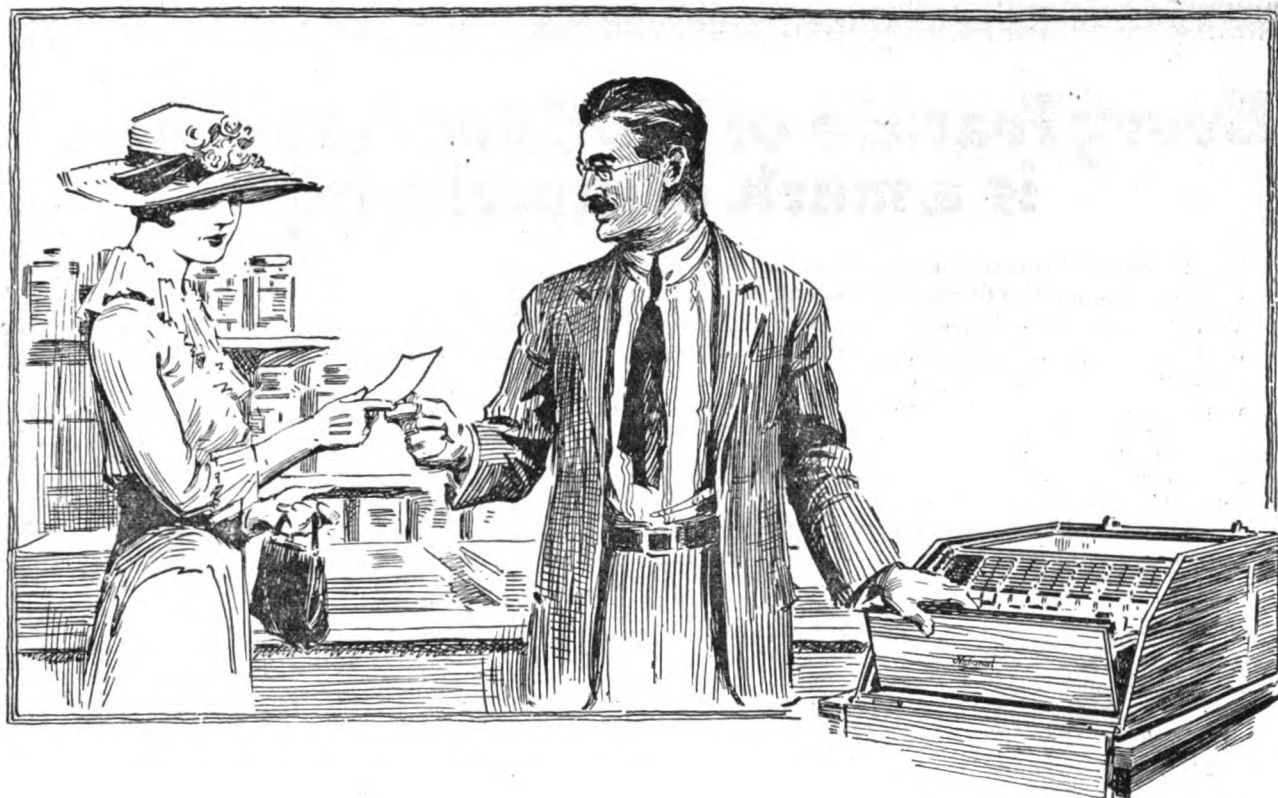
**JOBBER and DEALERS**—Your profit is liberal. Write today for our attractive proposition.

**UNIVERSAL MFG. & SALES CO.**

550 W. Harrison Street

CHICAGO, ILL.





## Every account is ready for instant settlement when the N. C. R. system for charge accounts is used

**W**HEN a customer comes into your store and wants to know how much she owes, you can tell her the amount instantly.

No time is wasted in hunting for her account in a large ledger. No time is wasted adding up the items or striking a balance. There is no worry about the accuracy of the figures.

Your clerk merely looks at the last charge slip filed under the customer's name in the N. C. R. Credit File and there is the total of her account to date.

This saves time for the customer, for the clerk, and for you.

You have the satisfaction of knowing that the amount she pays is right.

You know the amount is right, because with the N. C. R. Credit File you cannot forget to make charges. You cannot forget to credit money received on account. Mistakes cannot go undetected.

**Fill out this coupon  
and mail it today**

Dept. 26  
The National Cash  
Register Company  
Dayton, Ohio.

Please give me full particulars about the N. C. R. Credit File way of handling credit accounts.

Name \_\_\_\_\_

Business \_\_\_\_\_

Address \_\_\_\_\_

The National Cash Register Company, Dayton, Ohio  
Offices in all the principal cities of the world

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

## Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

**Over 350,000 sets now in use**

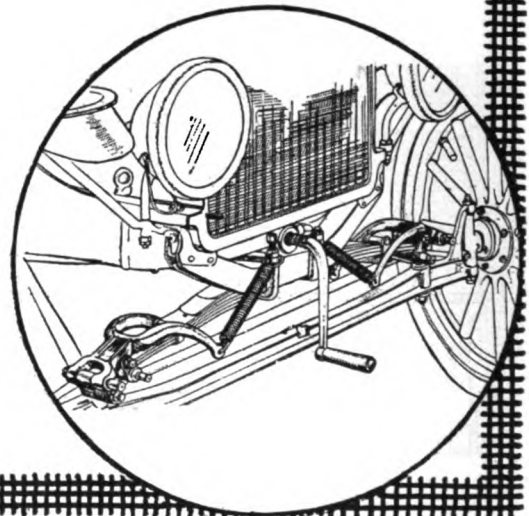
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

**Price \$12.00 per set of four.**

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

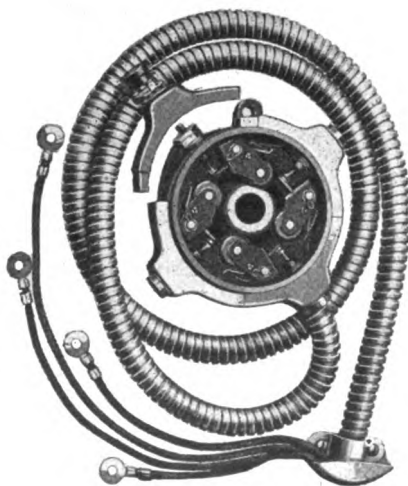
**P. H. Webber Company**  
HOOPESTON, ILL.

Chicago Sales Office:  
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.  
In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.  
London, Ont., Canada



## Duntley Magneto Break Timer

*The Only Self Cleaning Ford Timer on the Market*



Showing Guard and Timer Combined.

Every Ford Owner knows of the never-ending trouble, miss-fires, wasted gas, hard starting, annoyance and delay caused by dirty timer contacts.

The Self-cleaning wipe contact, an exclusive feature of the DUNTLEY, entirely eliminates the trouble, insuring an easy starting and a smoothly running motor at all times.

This feature of itself justifies installation, and—

There are five other exclusive features of equal importance.

### WIRE & TERMINAL GUARD

The damage and delay, trouble and annoyance caused by broken and leaky wires, loose connections and short circuits are daily costing Ford owners thousands and thousands of dollars.

The Duntley Wire and Terminal Guard does away entirely with the trouble makers. Carrying the wires from the coil box to the timer in a flexible metal conduit and encasing the timer and timer terminals with metal armor, it affords absolute protection to the most vital parts of the entire ignition system.

**Dealers: Wire or write us today for full details.**

**J. W. DUNTLEY 1014 Michigan Avenue CHICAGO, ILLINOIS**



## They Can't Overlook Your Oplex Sign

THERE is no possibility of overlooking the location of a garage or a showroom if it has an Oplex Electric Sign above its door. The raised, snow-white glass letters stand out like beckoning fingers both day and night; they flash your story to the thousands who are passing all the time.

Garage owners and automobile dealers find an Oplex Sign soon pays for itself in directly traceable business—it opens a way to tell people just what you have to offer.

An Oplex Sign costs only a few cents a day to operate. They have greatest reading distance, lowest upkeep cost and most artistic designs.

Let us tell you about Oplex Signs.

**THE FLEXLUME SIGN CO.** ELECTRICAL ADVERTISING  
Niagara & Potomac Ave.  
Buffalo, N. Y.

Pacific Coast Distributors  
Electrical Products Corp.  
Los Angeles, Cal.

Canadian Factory  
The Flexlume Sign Co., Ltd.  
Toronto, Ont.

# THE ROMORT AIR & WATER STATION

## Twice the service in half the time

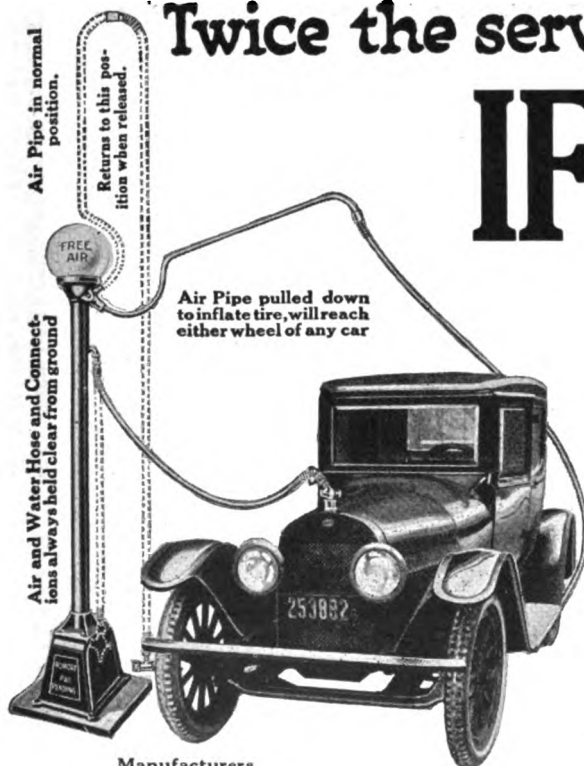
# IF

You were a car owner, would you patronize the garage that maintained a dirty, grimy air hose, one that lay around in the mud and dirt, the one which invariably soiled your hands and clothing, and a water service that consisted of an old water can in some dark, secreted corner inside the garage?

Or would you patronize the garage that maintained a clean air hose that never touched the ground, one you could use without danger of soiling your hands and clothing and had provided a radiator water service at the curb which was readily accessible for instant use, without loss of time and trouble to either yourself or the garage man?

You know the answer.

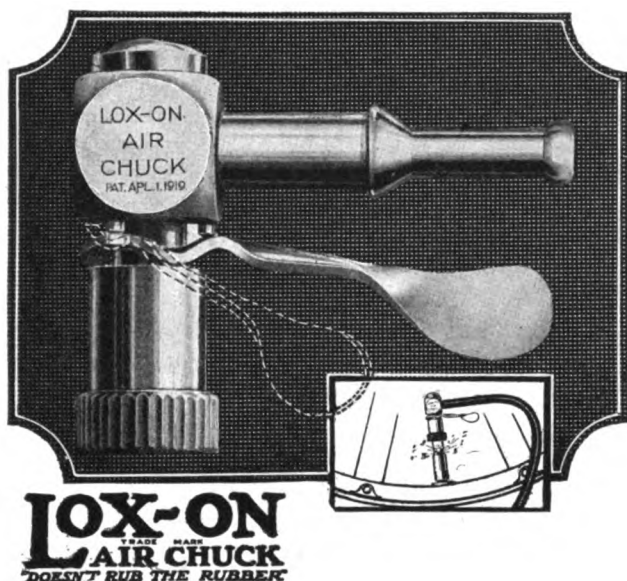
A glance at the illustration tells the story of the Romort Air and Water Station Service. It is built in two styles, With and Without Water Attachment.



Manufacturers  
**THE ROMORT MFG. CO.**  
Oakfield, Wis.

*A postal will bring full details.*

Sales Dept.  
**THE ZINKE CO.**  
1323 Michigan Ave., Chicago, Ill.



## Stops the Biggest Trouble in the Garage

**W**HY use the old style air chuck—nearly always leaking—needing new rubber washers—a continual source of trouble? Change to Lox-on Air Chuck—positively guaranteed not to leak—to wear indefinitely and to give sure, satisfactory service 365 days in the year.

The Lox-on doesn't *push* on like ordinary chucks. It *locks* on, gripping the valve firmly and preventing any leak. You don't have to *pull it off*, simply reverse the lever and *lift it off*. This saves all the wear of pushing and pulling a rubber washer over valve threads.



Because it can't leak, it saves electricity and wear and tear on pumps. It also increases the efficiency of your air station many times over. It is handy, strong and convenient. The universal stem fits either  $\frac{1}{4}$  in. or  $\frac{3}{8}$  in. hose. \$3.00 each.



## Whistler

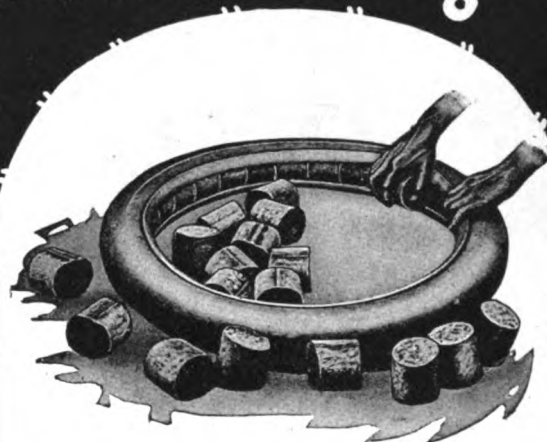
*Guards the tire against incorrect inflation. It whistles when the right amount of air enters the tire. You can't put any more in. Saves 50% to 75% on tires; 20% gasoline; 100% time; trouble and temper. \$4.00 per set of 4.*

**Automatic Safety Tire Valve Corp.**

1753-1755 Broadway, New York

Factory: Long Island City, New York

## The TIRE FILLER that has made good



## Trouble-proof tires with ample resiliency

is a combination that was long sought by the motoring public. Some tire fillers failed to stand up under long service—most of them lacked the essential resiliency. But these two vital qualities were at last combined in

## NATIONAL RUBBER TIRE FILLER

It has brought joy and satisfaction to tens of thousands of car and truck owners. It has done away with punctures, vulcanizing, patching, tire repairs of all kinds. Users get 10,000 to 20,000 miles out of every tire.

Besides, National Tire Filler has a wonderful resiliency. It takes the place of air, rides as easy, and does away with the inner tube.

National Rubber Filler is made of the best grade of rubber, cut in small particles, treated, moulded and vulcanized by our special process. The result is a compound that is light, strong and resilient. Made in sizes to fit all standard tires. It is laid in the tire and not melted or poured in. Will not harden, freeze, or melt—fully guaranteed against deterioration in any form.

DEALERS—National Rubber Tire Filler sells because it has made good. It combines comfort with economy of tire upkeep. We have a fine proposition for you. Write us today.

**National Rubber Filler Co.**

210 College St.

Midlothian, Tex.



# You get a good share of the profit.

The **MODEL "N" MARVEL CARBURETER** improves car performance, and increases mileage from 22 to 25 miles per gallon.

No changes are necessary to install it. Fits right in place of regular installation.

## MARVEL CARBURETER

*Designed especially for FORDS*

sold on 30 days' trial, with money back if not satisfactory.

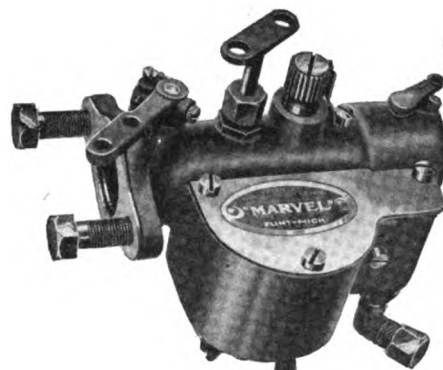
**Price F. O. B. Factory \$10.00**

**MODEL "E" CARBURETERS** are standard on Buick, Oakland, Nash, Scripps Booth, GMC, Wilson and all  $\frac{3}{4}$ -ton U. S. A. Government Trucks.

**MODEL "E" Carbureters** greatly improve Maxwell, Overland, and Studebaker cars.

*DEALERS--If interested, write for further information*

**MARVEL CARBURETER COMPANY**  
FLINT, MICHIGAN, U. S. A.



### STOP GUESSING! LEARN HOW!

LET US SOLVE YOUR AUTOMOBILE ELECTRICAL TROUBLES FOR YOU

Sixty-four Motor Car Manufacturers have adopted our service methods, testing instruments and publications. We help mechanics in all parts of the world to lessen their troubles and do their work better. Our testing instruments will enable the mechanic to locate electric troubles quickly and accurately. Our 500 page **INFORMATION Book** is full of simple instruction and wiring, and circuit diagrams. Below we list a few of our specials:—

|                                               |         |
|-----------------------------------------------|---------|
| Model 601 Test Sets complete with Cords,      | \$25.00 |
| Standard 500 page Information Books,          | 2.50    |
| Standard six-volt Magnetizers,                | 7.50    |
| Complete Wrench Set for all Ignition Systems, | 2.00    |
| Roller Smith Starting Circuit Ammeters,       | 4.00    |

Write today for catalog and full details. We prepay charges when remittance accompanies your orders.

Dealers Wanted

**H. E. PHILLIPS & CO.**  
Union City, Ind.

### TORIT OXY-ACETYLENE EQUIPMENT

**TORIT LEAD BURNING OUTFIT**, designed especially for battery repair work, but suitable for radiator work, soldering, brazing and light welding, such as fenders, brackets, etc. *Most convenient and profitable around the garage.*

**TORIT WELDING OUTFIT**, the ideal outfit for the auto repair shop. No garage is complete without a welding outfit, and no work is more profitable. *Let us tell you about the TORIT.*

**KEROSENE PREHEATING TORCH**—For the shop where considerable welding is done a preheating torch will save time and gas, and will help to give better welds. Quicker, cheaper, and more convenient than charcoal.

#### SERVICE:

*We conduct the largest and best-equipped welding shop in the Northwest. Crank cases, cylinders, etc., handled by experts.*

We **GUARANTEE** the finest kind of **ALUMINUM** work

**St. Paul Welding & Mfg. Co.**

172 West Third St.

St. Paul, Minn.

# FINCK'S

DETROIT SPECIAL  
OVERALLS & COMBINATION SUITS

Stand Everything  
But Acid

*There are a million reasons why you should wear Finck's Comfort Combinations—there are a million wearers. The "Pig" ticket guarantees them.*



Finck's Combination Suits have made "wonderfully good" for auto-workers, mechanics and garage men. The materials are the best and the garments are made perfectly. That's why they wear. They are cut extra big—so they will fit after washing. That makes them comfortable—all the time. In summer they are cool—yet snug-fitting enough to afford absolute protection to garments worn under them. They are convenient, too—plenty of pockets. In every detail as perfect as garments of this kind can be made.

*Ask your dealer or write to us, if he can't supply you.*

**W. M. FINCK & COMPANY**

Detroit, Michigan

Manufacturers of High Grade Overalls, Men's and Women's Combination Work Suits

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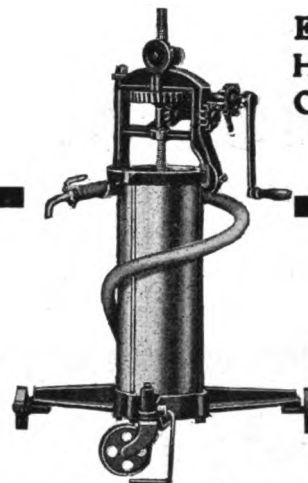
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(32)



POURS  
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STEADY  
PROFITS

ENTIRELY  
HAND  
OPERATED



Model K holds  
20 lbs. grease  
or 2½ gals. oil.

Model N holds  
56 lbs. grease  
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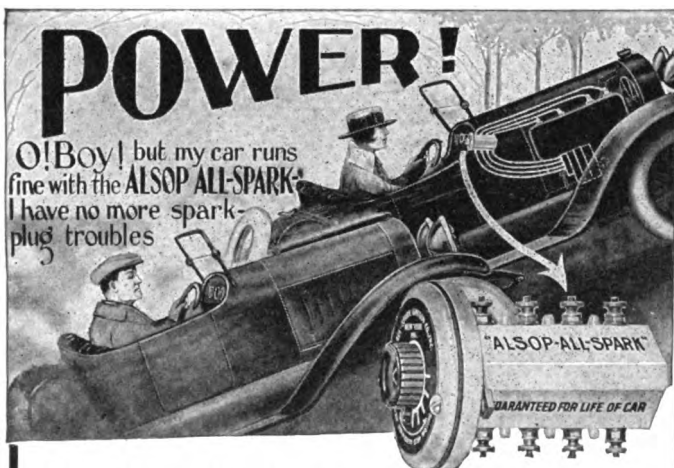
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Undoubtedly there is scarcely any garage equipment which is absolutely indispensable; yet there are a few products which come mighty close to being necessary. Among these, our "MODEL K" and "MODEL N" PORTABLE GARAGE GREASE GUNS are very prominent.

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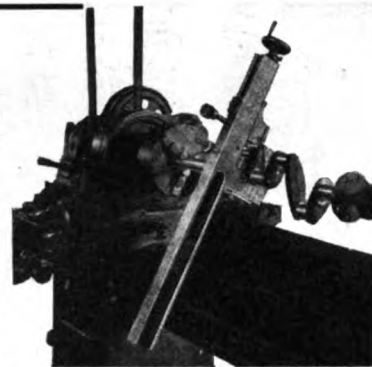
stop leakage  
and eliminate  
compression  
losses.

They stop oil leaks and yet provide ample lubrication. Try them. You can't lose, for we return your money if not satisfied.

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No Filing  
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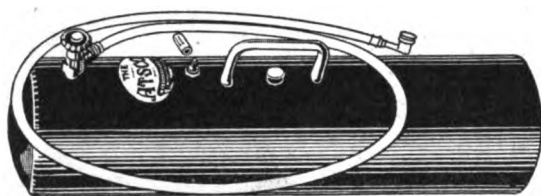
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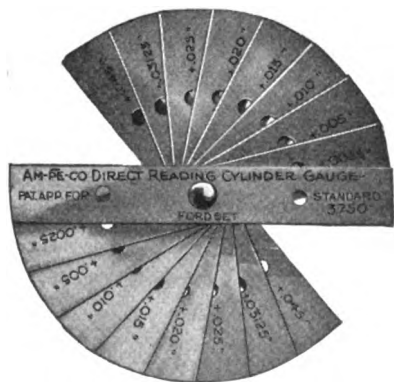
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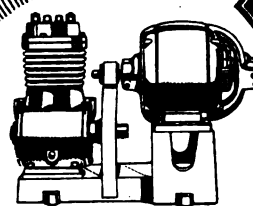
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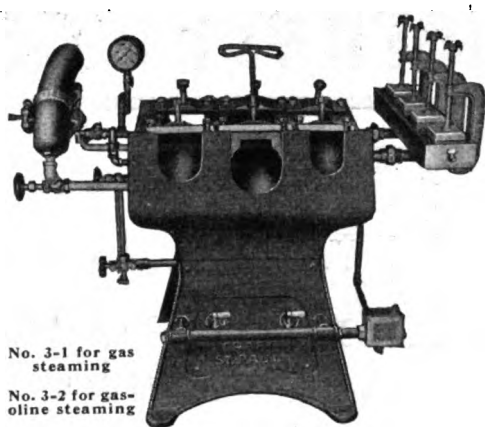
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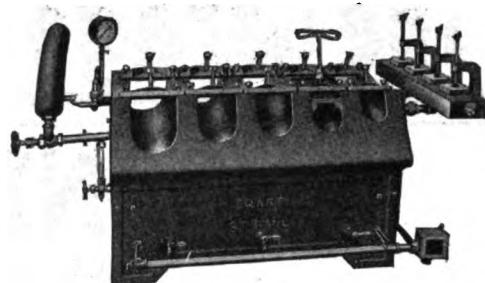
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Steel Spring Piston Ring Co., 145 Metropolitan Ave., Brooklyn, N. Y.

Utility Sales Corp., 808 New Stock Exchange Bldg., Philadelphia.

## PUMPS

Air-Tight Steel Tank Co., Pittsburgh, Pa.  
 Frank Rose Mfg. Co., Hastings, Neb.  
 Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.  
 Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

## SCHOOLS OF MOTORING

Greer College of Motoring, 1519 So. Wabash Ave., Chicago.

## SHOCK ABSORBERS

Philip H. Webber & Co., Heeperton, Ill. (W. & C.)

## SIGNS

Federal Electric Co., Lake & Desplaines Sts., Chicago.  
 Flexlume Sign Co., Niagara St., Buffalo, N. Y.

## SOLDER

Chicago Solder Co., 218 No. Union Ave., Chicago, Ill.

## SOLDERING FLUX

M. W. Duntley Company, Providence, R. I.

## SPARK PLUG INTENSIFIERS

Universal Mfg. & Sales Co., 552 W. Harrison St., Chicago.  
 All Spark Ignition Co., 13 Water St., New York.

## SPRINGS

Garden City Spring Works, 2000 Archer Ave., Chicago.  
 Harvey Spring & Forging Co., Racine, Wis.  
 Jenkins Vulcan Spring Co., 1403 Chestnut St., St. Louis.  
 New Era Spring and Specialty Co., Grand Rapids, Mich.

## STEERING WHEELS

Au-to Compressor Co., Wilmington, Ohio.

## TESTING INSTRUMENTS

H. E. Phillips & Co., Union City, Ind.  
 Weston Electrical Instrument Company, Newark, N. J.

## TIMER

J. W. Duntley, 1011 Michigan Ave., Chicago, Ill.

## TIMING DEVICES

Best Equipment Co., 234 W. Ohio St., Chicago.  
 Calougraph Co., 30 Church St., New York.

## TIRES

Brunswick-Balke-Collender Co., 623-625 S. Wabash Ave., Chicago, Ill.  
 Leo McDaniel Rubber Co., Cairo, Ill.

## TIRE PROTECTORS

Coffield Tire Protector Co., 21 Court St., Dayton, Ohio.

## TIRE PRESSURE REGULATORS

Automatic Safety Tire Valve Co., 1765 Broadway, New York City.

## TIRE REPAIR EQUIPMENT

Atlas Auto Supply Co., 630 W. Austin Ave., Chicago, Ill.  
 B. F. Goodrich Rubber Co., Akron, Ohio.  
 Stearns Rubber Products Co., 356 W. Madison St., Chicago.  
 Zinke Co., 1323 So. Michigan Ave., Chicago.

## TIRE RENEWING AND EQUIPMENT

Leo McDaniel Rubber Co., 304 Commercial Ave., Cairo, Ill.  
 Miller Rubber Co., Akron, O.

## VALVES

Romort Mfg. Co., Oakfield, Wis.  
 A. Schrader's Son, Inc., 782-796 Atlantic Ave., Brooklyn, N. Y. (Automatic Inflating Valve)

## VULCANIZERS

C. A. Shaler Co., 355 Fourth St., Waupun, Wis.  
 Vandervol Vulcanizing Co., Springfield, Ohio.  
 Wood-Craft Co., 1455 Marshall Ave., St. Paul, Minn.

## WELDING AND EQUIPMENT

The Imperial Brass Mfg. Co., 1224 W. Harrison St., Chicago, Ill.  
 Frank Chas. Owens, 19 No. Morgan St., Chicago.  
 St. Paul Welding & Mfg. Co., 172 W. Third St., St. Paul, Minn.

## WIRE AND TERMINAL GUARDS

J. W. Duntley, 1011 Michigan Ave., Chicago, Ill.

## WRECKING TRUCKS

Robt. Holmes & Bro., Danville, Ill.

## WRENCHES

Au-to Compressor Co., Wilmington, Ohio.  
 The Graham Roller Bearing Co., Coudersport, Pa.



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### KENNEDY Auto Storage Covers

furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

Made only by

THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind.

## Grind valves by the best and easiest way

with a light, rugged, evenly balanced portable tool with ample power. You get all of these features in the

## ECLIPSE Electric Valve Grinder

The New Model Eclipse has rendered hand grinding obsolete. It not only does a much better job, but does it in a fraction of the time and at a proportionately lower labor cost.

It oscillates and rotates, quickly giving a smooth finish and perfect fit to valve face and seat. Uses either alternating or direct current from ordinary 110 volt service sockets. Any man in your shop can operate it.

Write today for full description

**ECLIPSE VALVE GRINDER CO.**  
Dept. C, 20th St. at Oak KANSAS CITY, MO

## MILWAUKEE OUTFITS for GASOLINE and OIL



34 TYPES TO  
SELECT FROM

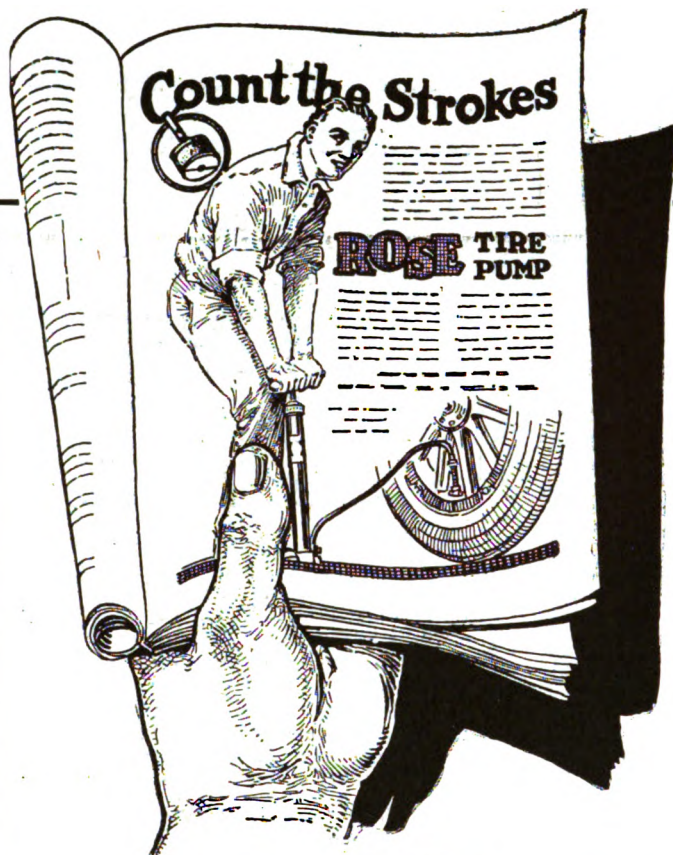
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UNDERGROUND  
"KANT-LEEK"  
TANKS - 60 TO  
12000 GALLONS

SPECIAL  
PROPOSITIONS  
TO JOBBERS

WRITE TO DAY  
FOR CATALOG "9"

**MILWAUKEE  
TANK WORKS**  
MILWAUKEE, U.S.A



# Nationally Advertised

**Your Customers  
Know the**

# ROSE



**"It's All  
in the Valve"**

# Tire Pump

We have taken the story of the Rose Tire Pump to millions of automobile owners throughout America. They know it delivers the goods. They know because we have kept our advertising before them continually. The next pump they buy will be a Rose.

This is the result of the most extensive and forceful tire pump advertising campaign ever undertaken. The Rose Tire Pump is by far the best advertised pump on the market today. Everywhere dealers are reporting increased sales. Advertising has

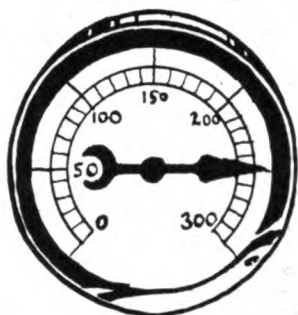
made it the quickest selling pump on the market.

Are you getting the best results from this advertising? We have made the Rose Pump the most popular on the market—have created a big demand. But it is up to you to complete the sale. A display of Rose Pumps in your window and on your counter will help. Offer your customer the pump he knows and the sale is quickly made. Thousands of dealers are cashing in on this advertising today. The opportunity is yours, too.

Our advertising also carries a word about the other labor saving accessories in the Rose line, featuring **Rose Grease Guns** and **Rose Fill-a-Gun Grease Buckets**. Your customer knows they are of the same high quality as the **Rose Tire Pump**.

## Frank Rose Mfg. Co., Hastings, Neb.





## Are You Equipped?

Can you furnish air of sufficient pressure for Pneumatic Truck Tires? **SOME JOB!** But you must be able to give these trucks air service if you are going to get your share of their gasoline, oil, repair and supply business. The amount of this business makes it well worth going after. A

## CHAMPION AIR COMPRESSOR

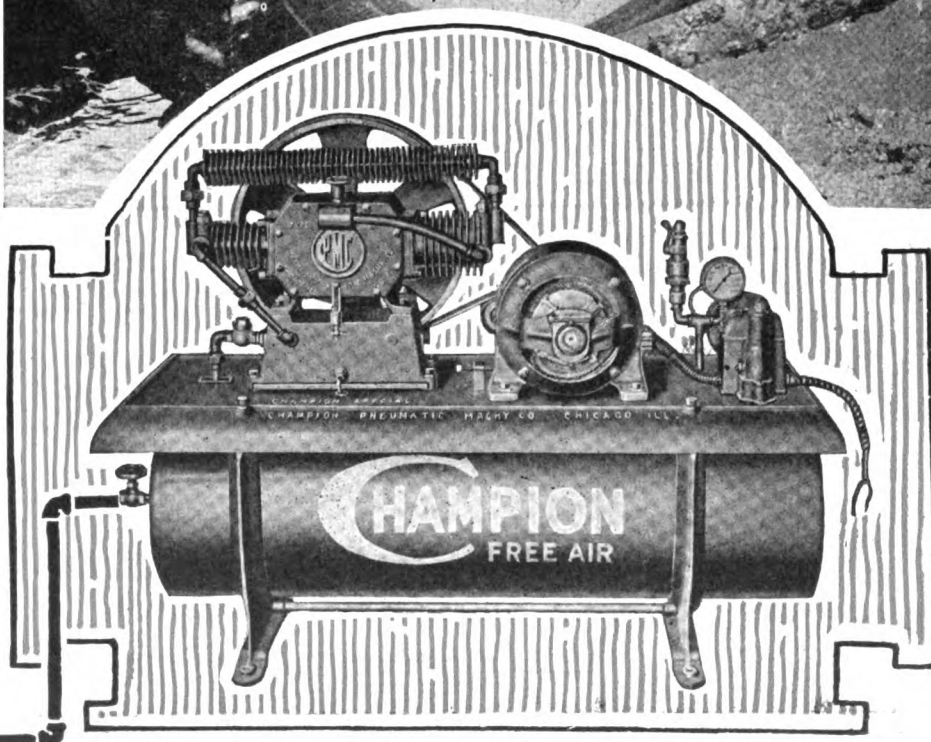
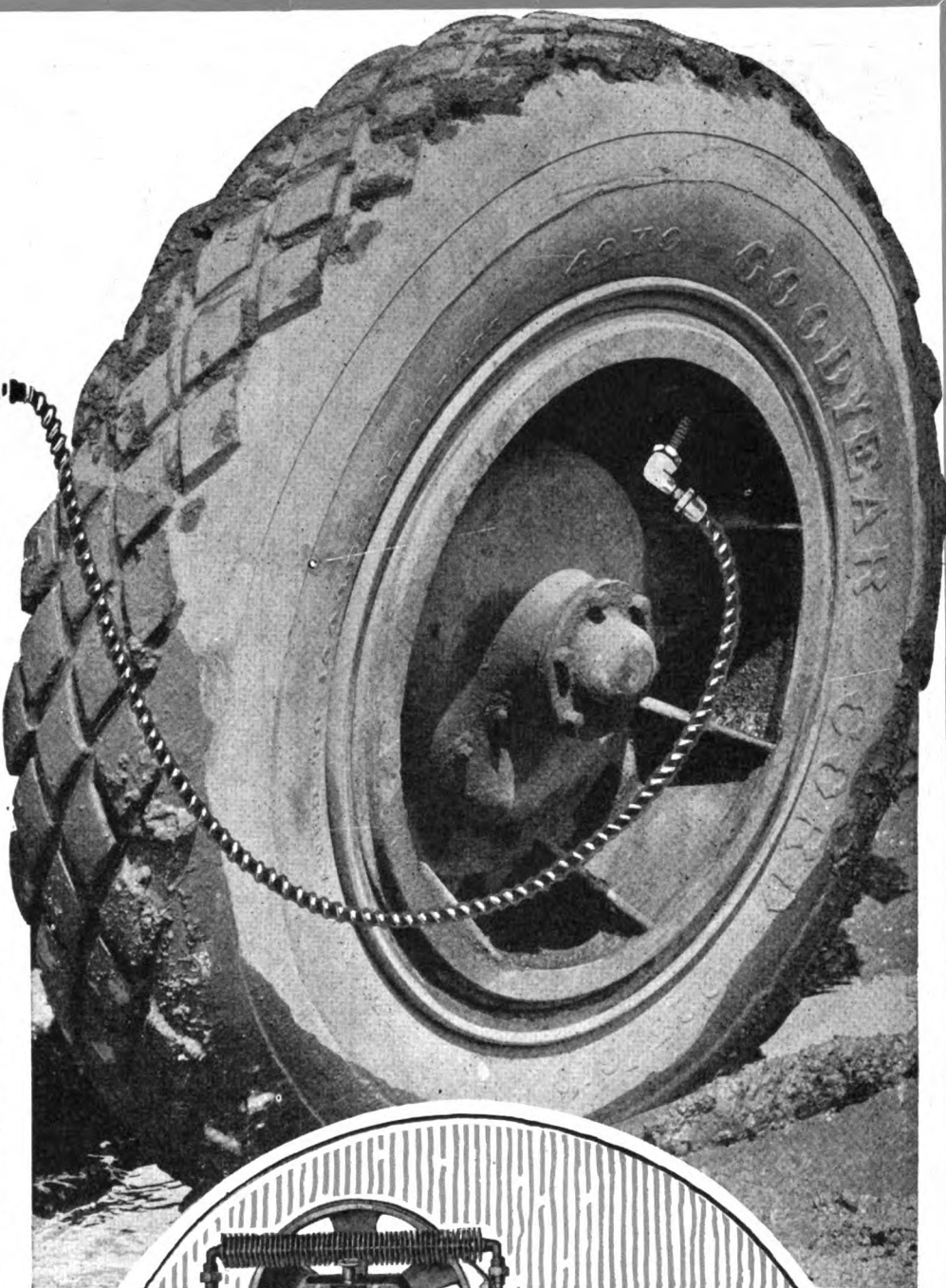
will enable you to furnish the biggest trucks with satisfactory air service. The tank furnished with the Champion Special Automatic Air Unit is tested for 250 lbs. working pressure, affording ample power. The CHAMPION is the fastest two-stage compressor on the market, and at the same time is noted for its low power cost and upkeep. The best of everything in the way of engineering skill, materials, and workmanship is embodied in the Champion.

*Backed by a liberal guarantee. Ready for prompt delivery. If interested in better air service, write for literature*



**Champion Pneumatic Machinery Co.**

1402 South Michigan Avenue  
CHICAGO





# Long Distance Service a Brunswick Certainty

**T**HE assurance of dependability over all roads, in any weather, is the chief factor in Brunswick Tire popularity. Tire after tire, they bring unvarying quality and plus service. Each one upholds the high merit reputation of the House of Brunswick.

This reputation should guide you in your selection of tires. For here are 75 years of skill and experience in the making of highest quality merchandise to pledge you utmost tire satisfaction.

Made in our own great factories, by workmen who are guided by the world-known Brunswick policies, these tires combine all wanted features.

To car owner and tire dealer, alike, Brunswicks are in high favor. If you are a tire user, try one Brunswick. You be the judge. If you are a tire dealer, write for Brunswick evidence and dealer plan.

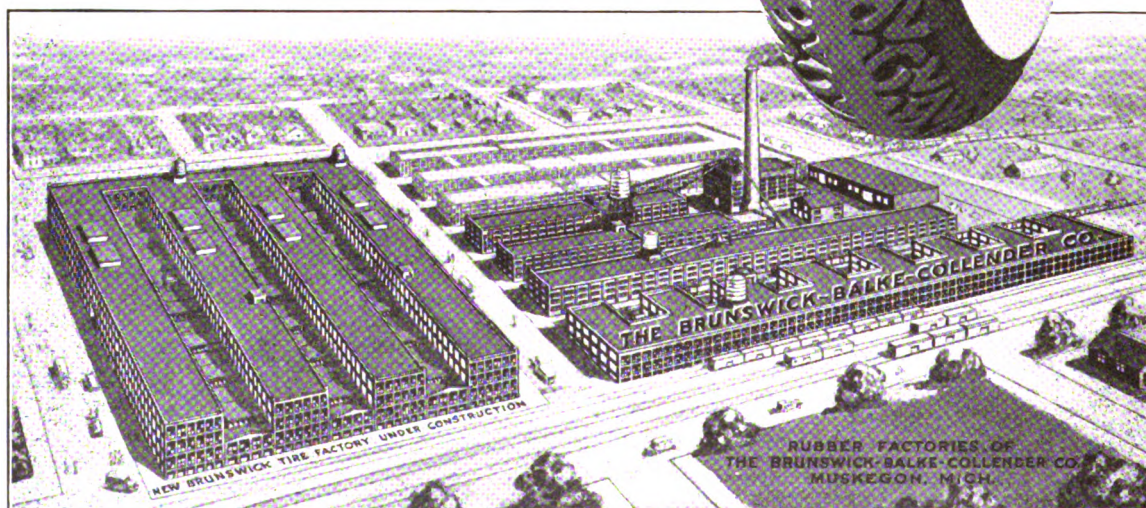
*Sold on an Unlimited Mileage Guarantee*

THE BRUNSWICK-BALKE-COLLENDER  
COMPANY

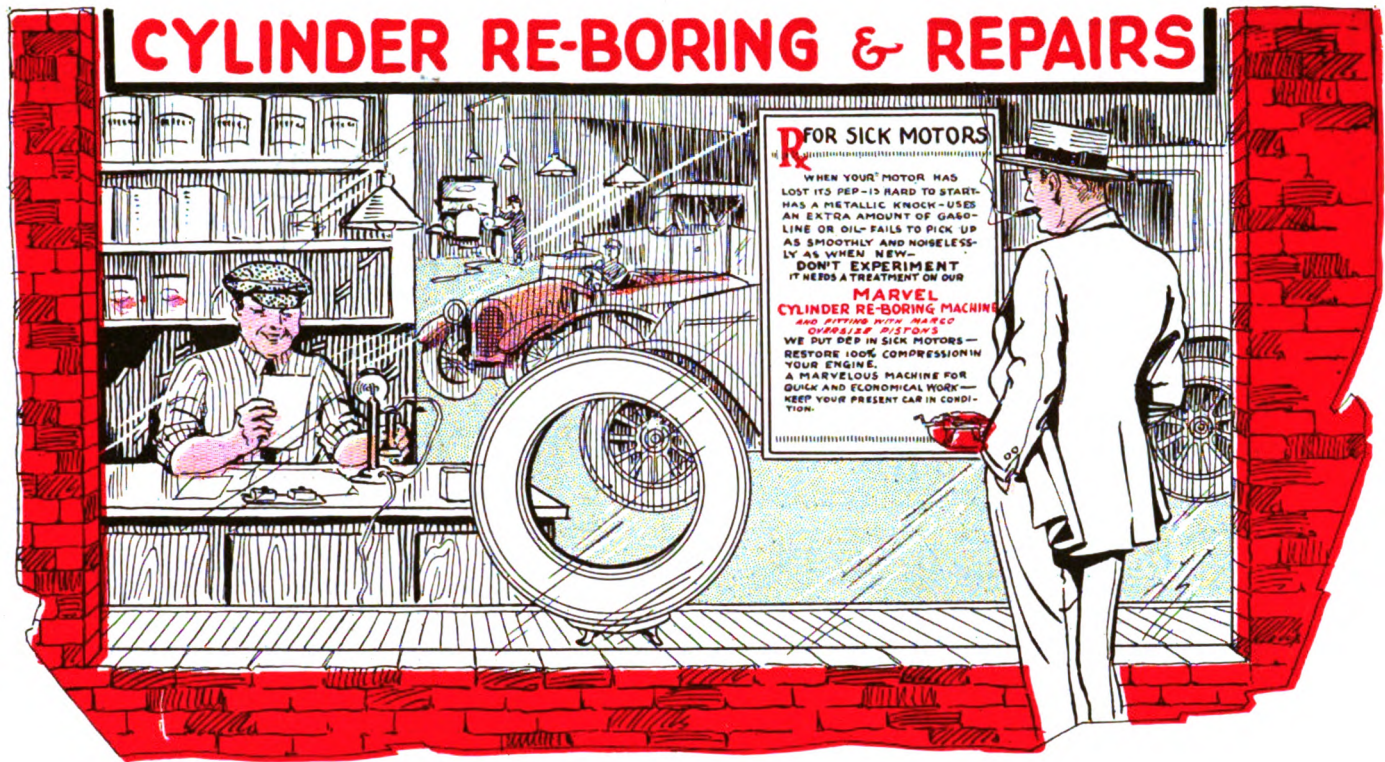
General Offices: 623-633 South Wabash Avenue, Chicago

Branches in Principal Cities of United States and Canada

## Brunswick TIRES







## Another Customer! You Can't Keep Them Away

With a MARVEL IN YOUR SHOP your business is operated on the endless chain basis. One customer tells another and each one becomes a booster. Every time your MARVEL adds pep to a motor you may be sure that another sick one will show up soon. It's as natural for one friend, with engine trouble, to follow another, when real MARVEL service and quality has been furnished as it is for Old Sol to chase the Moon in a circle every twenty-four hours.

The MARVEL is not a "happen-chance". It is not the outcome of the dream of some mechanic—it is a tried out and proven rectifier of gas engine cylinder troubles. It has passed through the experimental stages and has made good. It is a scientifically constructed machine following practical lines that re-bores gas engine cylinders in the shortest possible time—in the most accurate manner and handles any gas engine cylinder from a motorcycle to a tractor.

## Marvel Cylinder Re-boring Machine is Supreme

It is a year around machine—from January First to December Thirty-First it is the busiest machine in the shop. But right now—in the summer time—is the real time to get quantity business—now when the machines are on the go, when every minute the automobile is laid up means hours lost for pleasure—when every second the tractor is not at work means dollars lost to its owner.

## The Marvel Means Real Profit to You

There is no other machine like it. It is Accurate, Automatic, Speedy, and Reliable. It is Power Driven. It will double the man power in your shop and help swell your bank account.

Our Business Building Service immediately identifies your shop as headquarters for this class of high grade work. It helps bring customers to your shop and the MARVEL holds them.

We will gladly give you full information regarding this marvelous MARVEL. We will send you a list of satisfied users. We will show you just what a MARVEL means to you personally.

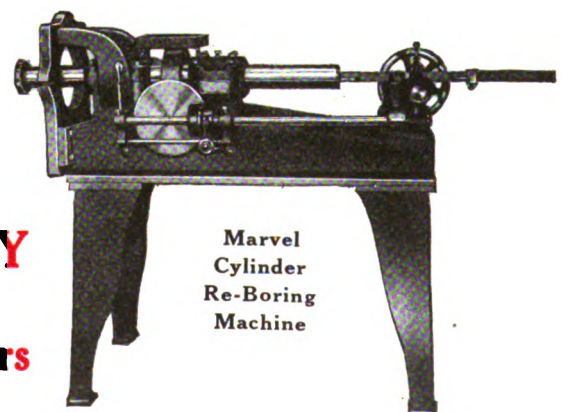
Write today—Don't put it off—Now is the time.

## MARVEL MACHINERY COMPANY

510 Loan & Trust Building, Minneapolis, Minn.

## THE FAIRBANKS CO., Exclusive Distributors

Executive Offices, 416 Broome St., New York City



Marvel  
Cylinder  
Re-Boring  
Machine

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



# "NORMA" PRECISION BALL BEARINGS

(PATENTED)

It is easy to claim precision. It is another matter to maintain it, in quantity production. That "NORMA" precision is a fact is demonstrated by the daily performance of hundreds of thousands of high-grade magnetos and lighting generators in which "NORMA" bearings are standard. It is this sustained precision which explains "NORMA" silence and serviceability at high speeds.

See that your electrical apparatus is "NORMA" equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# American Garage & Auto Dealer

Published Monthly

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Published on the 15th of each month by the  
**AMERICAN GARAGE & AUTO DEALER, Inc.**  
116 S. Michigan Avenue, Chicago, Ill.

J. R. HASTIE, *President and Treasurer*

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**SPINDLE CONNECTING ROD (OR TIE ROD) BENT FROM THE STRAIN OF SHOCKS AND JOLTS WHICH WEAKENS THE ENTIRE FRONT SYSTEM AND THROWS THE FRONT WHEELS OUT OF ALIGNMENT**

**BUCKLED FROM STRAIN OF SHOCKS AND JOLTS AND THE DANGER OF GOING OVER CENTER TRAVEL WHICH MEANS THE LOSS OF CONTROL IN —**

**A Ford Controlling Itself**

**SPINDLE CONNECTING ROD (OR TIE ROD) RELIEVED OF THE STRAIN FROM SHOCKS AND JOLTS WITH THE OVER-LAND GUIDE**

**STEERING CONNECTING ROD BUCKLING ARM REMOVED AND THE DANGER OF GOING OVER CENTER TRAVEL PREVENTED BY**

**The Over-land-Guide**  
PATENTED  
*Controlling the Ford*

## SAVE LIFE AND MONEY. PREVENT ACCIDENTS AND AVOID REPAIR BILLS

After the Over-Land Guide is installed give it a severe test and try-out. Drive the car over the roughest roads you can find and when you strike a hole six or seven inches deep, remove your hands from the steering wheel, regardless of the speed you are driving. Then you will realize how the Over-Land Guide controls the running of the car, absorbs all shocks, and eliminates the strain and vibration from the front system and steering mechanism.

### Ford owners will prove ready purchasers of the Over-Land Guide

When you show them what economy, safety and comfort they receive when they install the Over-Land Guide there is no difficulty in closing the sale. Our liberal guarantee and trial offer will win over the most skeptical. Once a few of them are installed in your locality, Ford owners will come in and ask for it.

### What the OVER-LAND GUIDE does for the Ford

Over-Land Guides relieve the strain on those parts of the front system of the Ford car which ordinarily are subjected to undue strain resulting in breakage and repair bills. Prevent the steering connecting rod from going over center travel in short turns, which means the loss of control and the possible destruction of the car and the lives of the occupants.

They save tires, mechanical wear and increase vehicle life.  
Prevent skidding and all dangers from uncertain control.  
Protect vehicle and occupants should the steering gear break.  
Control the machine should a tire blow out at any speed. Keep the vehicle moving directly ahead and the wheels constantly aligned.  
Increase driving pleasure and vehicle efficiency.  
Absorb road shocks that would be communicated to the driver's hands and arms.  
With it a machine can be steered with the finger tips.  
May be changed from one machine to another.  
Can be quickly installed without special tools.  
Will last indefinitely.

#### OVER-LAND GUIDE prevents wear of

|                |            |                 |                   |                 |
|----------------|------------|-----------------|-------------------|-----------------|
| Wheels         | Drag Link  | Steering Pivots | Spring            | Tall Lever      |
| Wheel Spindles | Radius Rod | Tie Rod         | Wheel Bearings    | Steering Column |
| Steering Arms  | Tires      | Steering Lever  | Steering Knuckles | Spring Shackles |

DEALERS & JOBBERS—Write today for our attractive sales proposition.

### THE MEIXELL COMPANY

216 Board of Trade Building, INDIANAPOLIS, IND.

Foreign Distributors—Automobile Sundries Co., 79 Walker St., New York, N. Y.

This broad guarantee protects users of the Over-Land Guide. Send us retail price, \$8.50 and we will send you, parcel post, one Over-Land Guide. Use it 20 days, properly installed, and if at the end of that time it does not do all we claim for it, full purchase price will be refunded.



In ordering state the year your car was made.

Unlike all other STEERING DEVICES, the SPRING in the Over-Land Guide is packed in hard grease and completely enclosed, which keeps it free from dust and moisture and means indefinite service and no up-keep.



TRADE MARK REG. U.S. PAT. OFF.  
"Unlike any other paper"

Ever notice how certain brands of goods have a habit of leaving your store and moving out into the country to make room for more goods just like them? Something must be pushing them, or pulling them, or both.

*It's both!* The *pull* is from hundreds, perhaps thousands, of The Farm Journal readers in your community and the *push* is from the manufacturers who advertise in this greatest of American farm papers.

The Farm Journal is read, kept, re-read, and depended upon as a buying guide.

*Get on the right side of your Postmaster and check up on the circulation of general magazines and farm papers in your community. You'll get some information that will be valuable when you buy your next bill of "advertised" goods. And, also, write to us and find out exactly how many Farm Journal subscribers are within easy reach of your store.*

# The Farm Journal

CHICAGO PHILADELPHIA NEW-YORK

*Sells Most Goods Because  
Read by Most Farmers*



# THE NEW IMPROVED Master Hydrometer

## Note This Test

The photo reproduction below shows an actual test of a Master Celluloid Ring Guide Hydrometer float and an ordinary float under identically the same conditions. Notice that the MASTER float rides freely making an accurate test possible, while the ordinary float sticks to the sides of the glass tube. The float does not come to the surface properly, consequently it cannot register correctly.

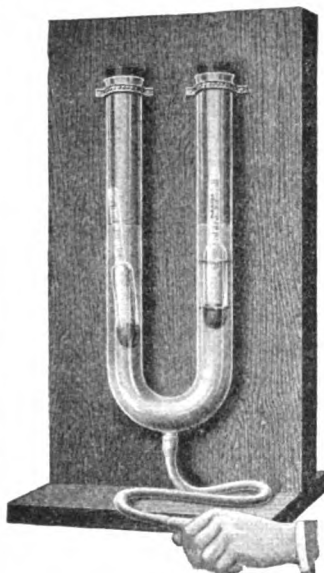


The Battery Guard

## Why the MASTER is Best

See illustration. Note how the studded celluloid rings on the float keep the tip from sticking to the tube. See how the solution is permitted to flow past the float between the four studs on each ring—making it possible to secure an instant, accurate reading, practically impossible with old style instruments.

## Garages, Auto Accessories, Stores, Service Stations, Repair Shops



It doesn't take long to prove to the car owner that he needs the MASTER Hydrometer. You, yourself, know that 90% of battery troubles and expenses are due to neglect that the owner can prevent or reduce if he has the means.

Get this MASTER Hydrometer for your trade. With it, any owner can make readings that are positively accurate—for, the MASTER is a real "Battery Guard."

There is a generous cash profit on each one for you and a much larger profit in the goodwill of your customer who buys one. The MASTER Hydrometers sell at a price that will easily compete with any other hydrometer on the market.

## The MASTER is BEST Because

In the Master Hydrometer, the studded celluloid rings on the float (see illustration) keep the tip from sticking to the side of the tube and makes accurate reading possible. The acid flows past the float between 4 studs on each ring just as rapidly as in the old style instruments.

### Dealers

Write us today. We handle the largest accessory line in the world. The Hydrometer is just one of thousands of excellent products we sell. Each one guaranteed in every way, and allowing a just and equitable profit to the dealer. Send the coupon and secure our large general catalog.

### Car Owners

You need a MASTER Hydrometer. Insist on getting it. If, for any reason, your dealer is not supplied send us his name and we'll see that your wants are taken care of. Write us now—you will obtain preferred service if you do.

## The Beckley-Ralston Co.

1801 Michigan Ave., CHICAGO, U. S. A.

New York Detroit San Francisco Pittsburgh Kansas City



Send coupon  
for Catalog of  
Automotive Ac-  
cessories and  
Discounts.

The  
Beckley-  
Ralston Co.

Department Y.  
1801 Michigan Ave.,  
Chicago, Ill., U. S. A.

Send at once prices,  
discounts and full infor-  
mation regarding the Master  
Hydrometer. Also send us  
your latest catalog and discount  
list of Automobile Accessories.

Name .....

Address.....

## TIRE-DOH makes any repair regardless of shape

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## TIRE-DOH

makes repairs that are permanent because it stretches with the rubber. No strain can cause a leak. In addition to tube repairs TIRE-DOH is used on casings to fill holes and cuts—thus preventing blow-outs and sand blisters. TIRE-DOH repairs any rubber article—gloves, boots, hot water bags, hose, etc. Our National Advertising, appearing in six great magazines is creating new TIRE-DOH users every day—in every locality.

Our "NU-SEAL" guarantees to the purchaser that his can of TIRE-DOH will be fresh and usable to the end. This new method of sealing also stimulates sales.

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Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,  
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

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CHICAGO

July, 1920

## A Gasolene Famine?

Recently there has been much in the newspapers relative to the supply of gasolene—and many opinions have been expressed that we face a gasolene famine. Some even go so far as to predict that the use of automobiles will have to be discontinued.

In the opinion of the Federal Trade Commission, the gasolene scare has been largely psychological. The early months of this year showed an increase in production in this country. Should an absolute shortage of gasolene confront the market, oil men state that production may be greatly increased by adoption of the new "cracking" processes.

It is declared that refiners can get twice the amount of gasolene from oil by use of these processes. The big Mid-West companies, using modern methods, are said to be getting a 35 per cent yield from crude oil while other refineries get only 12 to 22 per cent. The cost of installing the new processes, however, is such as to make the change slow, but once made, it would mean an increase of about 60 per cent in the present supply.

"The total consumption in 1918 exceeded production by 114,929,850 gallons, while in 1919 the relation was reversed and the production of gasolene exceeded consumption by 149,446,488 gallons," says the Federal Trade Commission.

On the other hand, The American Petroleum Institute, composed of leading oil producers, asserts in a bulletin issued early this month, that

since August 1, 1919, consumption of petroleum in the United States has been in excess of domestic production, the rate of excess being 33,717,240

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## If You Know That

**Trusting in the other fellow's squareness and integrity will vindicate your judgment 99 times out of 100; and that to**

**Radiate happiness and sunshine will cause the days to brighten; that**

**Ambition properly administered cannot be thwarted; that**

**Faith in your ideals will be fulfilled in the days of pleasure to come; that**

**Forever seeing the bright side will remove a mountain of worries; that by**

**Inviting friendliness you are really inviting business; that**

**Cultivating a smile and a pleasant countenance may be likened to investing a dollar in an oil well and having a stupendous gusher break forth—**

**If you know all of these things and act accordingly, then**

**It's HORSE SENSE  
You have.**

---

barrels per annum. The bulletin says, in part:

"It is estimated that there will be 12,000,000 automobiles in the United States in 1921. It will be necessary to run 713,428,000 barrels of crude oil

through the stills of the United States, or 1,954,597 barrels per day. (The still capacity on January 1, 1920, was 1,530,565 barrels per day.)

"This would require an increase of nearly 100 per cent in the quantity of crude over 1919, whereas the crude production of the United States in 1919 showed an increase of only 71 per cent over the total for 1911."

The oil men, however, are not at all pessimistic over the outlook, for the bulletin goes on to say:

"The oil business has ever met every public and private demand, and we are confident that it will continue to do so through:

"1. Conservation of petroleum and its products.

"2. Increased production.

"3. Increased importations.

"4. Increased efficiency in the construction of automobile engines; a great change in this respect is probable.

"5. Increased efficiency in refining, i. e., getting more gasolene and other valuable products out of each barrel of crude."

If conditions in Mexico ever get settled so that the country is placed on a stable basis, this country may obtain great quantities of crude oil from there. Despite the prevailing conditions, over 52 million barrels of crude oil were shipped to this country last year—and it has been almost doubling its shipments each year.

All in all, it is not likely that we shall experience any great shortage of gasolene. Some parts of the country

may run short, due to transportation difficulties, but "the worst never happens in the United States."

### Figuring Your Way to Frankness.

If a representative of one or the other of the leading commercial agencies should ask you some day for a financial statement, how long do you suppose it would be before you could give it to him?

Are you sure you could give him one at all—that is one that showed your financial condition to date, and one which you would be willing to sign and attest that it was correct in every respect?

You know requests are made for these statements once or twice a year and oftener, if the wholesale house from which you buy feels that it is necessary. Even if you are buying on a cash basis at present, requests often are made for statements just the same, because the wholesaler knows that some time you may want credit.

Then again the average credit man likes to know the person he is dealing with, just the same as you would rather know more intimately one of your own customers who is a regular buyer. He finds this a good way to get acquainted with you because a commercial reporter, like his brother, the newspaper reporter, will get the information some way or another. If not your way, it will be another—and another way might not be just to your liking, and perhaps not so accurate either.

You can see then how much it is to your advantage to have up-to-date figure knowledge about your business so that you can supply this knowledge promptly to those who are entitled to it, whether it be your wholesaler or your banker, or any one else for that matter, who in any way is granting you credit.

Why shouldn't a dealer be frank with his wholesaler or his banker from whom he is obtaining accommodations? The information is always held in confidence. But you never can be frank with either one or the

other unless you have the knowledge to give them. That, however, always means accurate figure information available at any time when it is requested.

### National Advertising and Dealers.

Advertising pays! That is the reason manufacturers are so insistent that retailers adhere to a certain selling

#### Dan McGann and Uncle Sam.

*Said Dan McGann to a foreign man who worked at the self-same bench,*

*"Let me tell you this," and for emphasis he flourished a monkey wrench.*

*"Don't talk to me of this bourgeoisie, don't open your mouth to speak*

*Of your socialists or your anarchists; don't mention the bolsheveek,*

*For I've had enough of this foreign stuff, I'm sick as a man can be*

*Of the speech of hate, and I'm telling you straight that this is the land for me!"*

*"If you want to brag, just take that flag, an' boast of its field of blue,*

*An' praise the dead an' the blood they shed for the peace of the likes o' you.*

*I'll hear no more," and he waved once more his wrench in a forceful way,*

*"O' the cunning creed of some Russian breed, I stand for the U. S. A.!*

*I'm done with your fads and your wild-eyed lads; don't flourish your flag o' red*

*Where I can see, or at night there'll be tall candles around your bed."*

*"So tip your hat to a flag like that! Thank God for its stripes and stars!*

*Thank God you're here where the roads are clear, away from your kings and czars.*

*I can't just say what I feel today, for I'm not a talking man,*

*But first an' last, I am standin' fast for all that's American.*

*So don't you speak of the bolsheveek, it's sick o' that stuff I am,*

*One God, one flag is the creed I brag! I'm boostin' for Uncle Sam."*

—Edgar Guest.

price on the manufacturer's product. He has spent goodly sums of money in advertising to make his product known and to create a demand for it, so that the dealer expends little selling effort to dispose of his stock of what might be termed nationally advertised goods.

One dealer in a town, cutting the price on a nationally advertised ar-

ticle cuts, not only his own profit, but that of the other dealers as well as the manufacturer. The other dealers find the demand falling off and as soon as they dispose of their stock of that particular article, discontinue carrying it.

Naturally the dealer who originally cut the price then, in turn, discontinue carrying that article for he knows that there is little or no profit in it at the selling price for which he, himself, is responsible. Thus both manufacturer and dealer have lost profits, and the good will and demand created by advertising has been destroyed. But this is not along the line which we intended to talk.

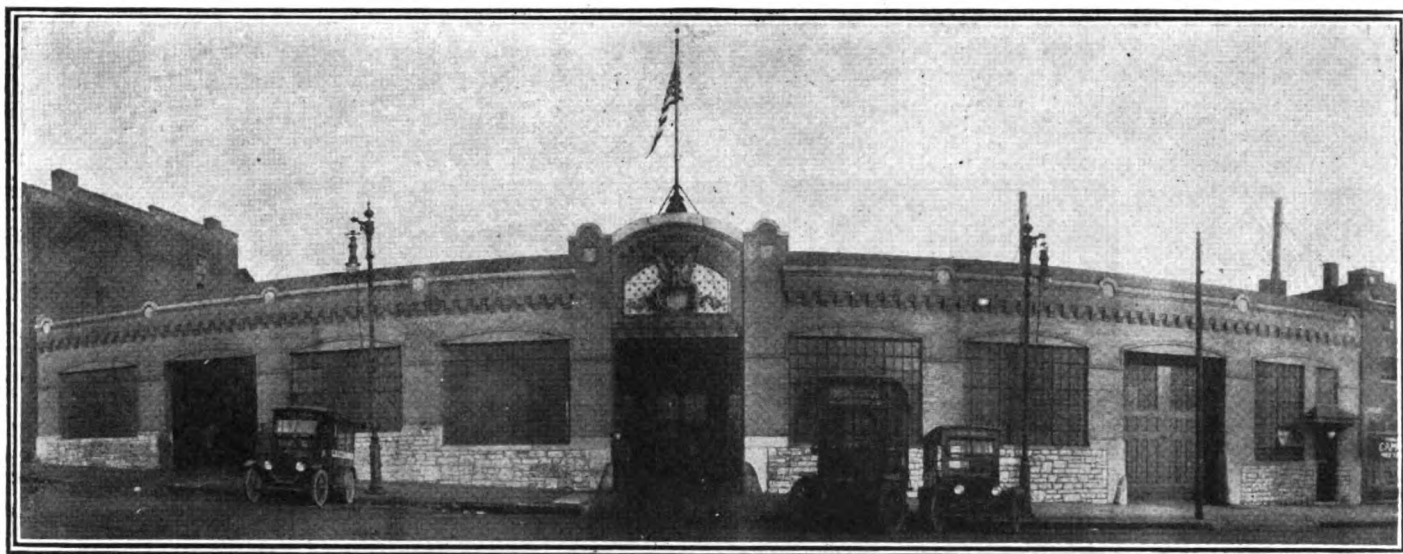
The pages of the various issues of the so-called popular magazines contain advertisements of many products of more or less direct interest to the general public—the ultimate consumer, so to speak. Ordinarily the sale price is fixed so that, regardless of where located, the consumer pays the same price.

When a new tire, spark-plug, carbureter, or some other device for use on or in connection with the operation of, a car is brought out, announcement is first made to the dealers or trade through the various trade papers, such as the AMERICAN GARAGE & AUTO DEALER.

When sufficient production and distribution are assured, then so-called national advertising is inaugurated. In other words, the dealers are first informed of the advantages of the new product and the profits which they may expect from selling it, causing them to stock up and anticipate the demand, and then the interest and desire of the consumer is secured through advertising in the popular magazines and newspapers.

The connection between nationally-advertised goods and the dealer is interestingly discussed in an article "The Wise Way of George Wiseman," by Frank Farrington on other pages of this issue. It is well worth careful reading, as Mr. Farrington is an expert on merchandising propositions.





# A Great Garage Owned by Uncle Sam

A United States Postoffice Garage Where Everything Is "Up-to-Date and Figured Fine"—Detailed Description of Modern Stock Keeping, Inspection, and Maintenance Methods, Showing Application of Efficiency Principles

By James F. Hobart

The postmaster at St. Louis, Mo., has under his direct and almost personal charge a large garage where the many automobiles, trucks and "flivvers" used by the collection and delivery departments are cared for and kept always in first class condition—ready for instant use at any time. There never was a car or a truck sent out of that garage that was not in first class condition, without a tank full of gasoline and everything aboard which belonged to it.

The big garage was erected on Seventeenth street, diagonally opposite the postoffice and its facade was made to harmonize very pleasingly with the architecture of the postoffice building. The garage building is nearly 200 feet long and extends from Seventeenth street to the alley, upon which are several doors which are normally kept permanently locked, the only entrance and egress for automobiles being through two doors on Seventeenth street, and a narrow door leading directly to the office of the garage.

All cars enter the garage through one door, that farthest up hill, toward Market street, and cars leaving the garage all pass through the down-hill door, almost directly in line with the street leading past the postoffice building. But the entrance to the garage for visitors—well, that's an

entirely different matter to be sure.

Before he can get very far through that narrow door down at the far end of the garage, the prospective visitor will have gone to the postoffice, passed in succession two or three officials, giving his life history to each, until he finally reaches the postmaster in person, a very affable gentleman, but one who is very proud of his garage and who is sure to know mighty well what he is going there for before he calls over the garage superintendent and turns the visitor over to him personally—and then, the way is clear.

You cross over to the garage and everything of interest which it contains is placed before you without reserve. Each and every car which runs into that garage is stopped right at the door by a man who is on constant duty there—and no car ever gets past him. This man has charge of the gasoline supply and filling station, which is of the usual underground type, located right beside the door through which cars enter the garage.

Each car driver is trained to stop his car right at the door as soon as the rear wheels are far enough in to allow the door to be closed. In warm weather the cars stop as soon as the rear wheels have passed off the sidewalk. Then, cars which are going to

the repair section of the garage, have their gasoline tanks drained and are sent along to the repair portion of the building.

Cars which are to go out again are at once "gassed" to the full capacity of their storage tanks. Every drop of gasoline put into the tank of any car is immediately charged to that car by the man in charge of the "hold-up station" at the door. Not a thing gets into any car from this garage without being charged up to that car, and when the gasoline is drained from a car which is bound for the repair section, the gasoline taken from its tank is credited to that car in full.

Not only is everything charged to each car, but an actual account is kept separately with each car from the time it first enters government service until it is scrapped or sold. Neither thing often happens to postoffice cars in St. Louis, because they are being constantly rebuilt and seldom arrive at the "scrap-heap" stage, except in case of a complete wreck.

The car which has run the gauntlet of the hold-up man at the door passes into the garage and turns to the right or to the left according to its needs. When it turns to the left it reaches the "wash-block" where hose and washers speedily remove the very neighborly Missouri mud, and the car is run at once to its "stall" to remain

until it is called for by its driver.

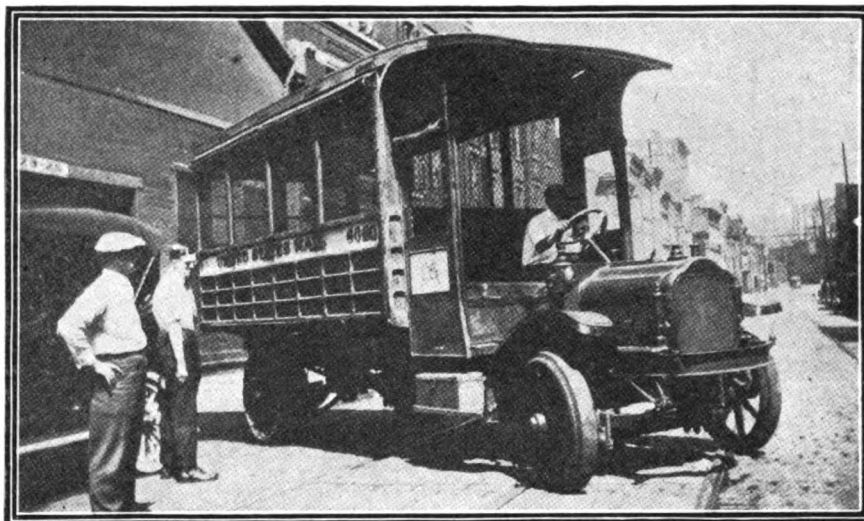
By the way, the personality of each driver is reflected in the account which is kept with each car. From that account, the superintendent of the garage—and the postmaster, too—keeps an eagle eye upon the manner in which each car is operated by its driver, who, indirectly, through the car, is credited with the number of miles run and debited with gasoline, tires, repairs and parts from stockroom.

In that way, drivers who are reckless and whose cars are charged with a good deal of running and repair ex-

pense are quietly transferred to a car which has heretofore shown a low cost of upkeep. Then, if the high expense of car maintenance follows that driver to the car which has heretofore been run cheaply, it is assumed that the driver is at fault instead of the car and the expensive driver is soon seen no more in the postoffice garage.

The changing of the driver from an expensively operated car to one which has been operated at low cost shows whether it was the fault of the car or of the driver, avoiding any possible injustice to the man, and better enabling the poor drivers to be sifted out, to the considerable advantage of the service and a distinct lessening of car operation expense.

The garage building, which was erected for housing the postoffice cars, is a single story high and the roof is supported upon the walls and upon two lines of posts along the



This Big Fellow Is Typical of the Well-Kept Cars In Uncle Sam's Garage.

length of the building. This arrangement permits three clear ways, or "bents," and the front space, next to the street, is devoted wholly to the parking of cars, save for the entrance and exit driveways and one post-space at the down-hill end of the structure. This space is occupied, across the entire width of the building, by office and stockrooms.

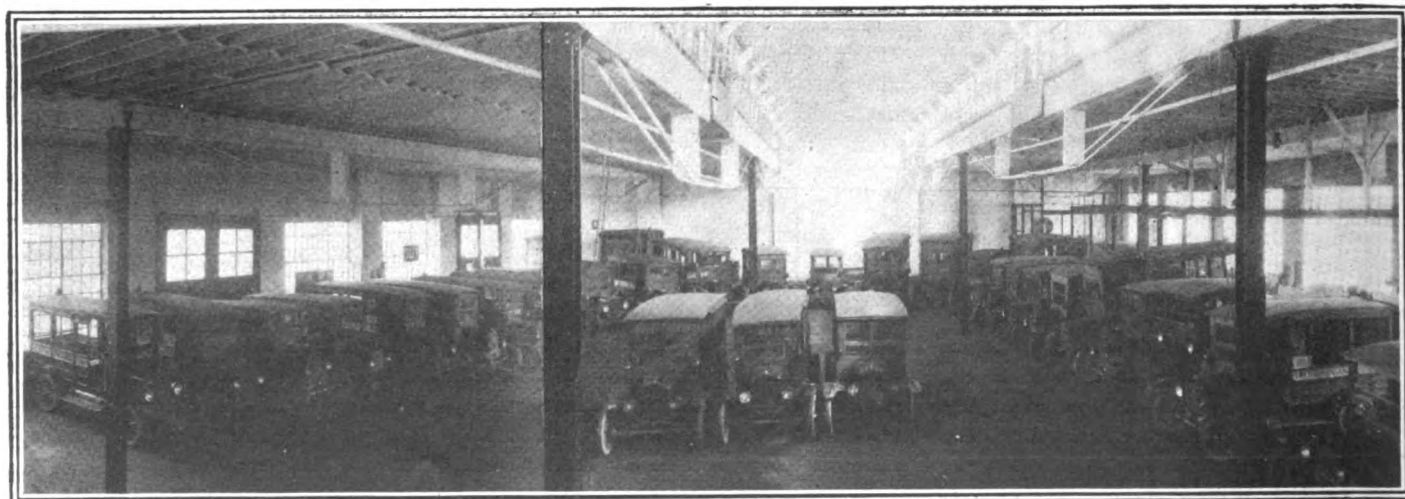
The middle bent of the building is used as a clearway along which cars may be driven from entrance to exit and for the getting into and backing out of the regular "stalls" occupied by the cars when not in use. The middle space is surmounted by a large monitor roof or "lantern," through which large volumes of daylight are admitted to the garage's center part.

The clear-space along the back of the building, next to the alley, is used as a repair shop for rebuilding, and for the heavier repair operations. Many minor repairs are made to cars while they are in the middle clearway, or while in their regular stalls.

At the back of the building, to the left of the entrance door, two post-spaces were allotted for a paint shop. A tight partition of match-board was erected from roof to roof at the second post from the end of the garage and the partition was built from the alley side to the first row of posts, then parallel with the side wall for another post-space. This arrangement gave a wall upon three sides of one post-space square. In this square were located the forge, anvil, drilling machines, emery and polishing wheels and all the worst of the dirt-causing repair machines.

The one-post length of partition separated the "dirty-repair" space still farther from the two bents which were reserved for paint-shop purposes and to still further keep dust out of this space, heavy and well-fitting duck curtains were hung from the roof, or from a slight board partition which extended from the roof to a line just below the roof timbers, forming a straight and smooth hang-

(Continued on page 40.)



Volumes of Daylight Pour Through the Monitor Roof Into the Clearway Where the Cars Are Housed.

# The Wise Way of George Wiseman

How One Garage Owner by Stocking Up with Goods Advertised in National Magazines and Trade Papers Was Able to Get More Trade Than Other Garages in His Town, Although His Place of Business Was Off the Beaten Path

By Frank Farrington

"There's a new kind of spark-plug I believe would be a good buy," I remarked to my neighbor, Johnson, as we sat side by side in the car on our way down to business the other morning. Each of us was looking through the latest issue of the Sat. Eve. Post.

"The advertisement certainly describes it as a plug that would produce wonderful results, but I'll bet I can stop at half a dozen garages today and ask for those plugs and not one of them will have any of them—most of them won't even know there is such a thing. The garagemen where I go don't seem to get onto these new things until they aren't new any longer. They seem to think the best way is to wait until cars begin to come in with them on and the owners demand replacements of the same identical make."

"I don't believe you know about Wiseman's garage, do you—that little red front garage around on Soot street, just back of Automobile Row?" inquired Johnson. "It's not a very big outfit and it's located in an out-of-the-way place. It's run by George Wiseman—used to be with the Ford agency.

"I want to tell you that Wiseman is right up to the minute on all the new things. I've sent a good many fellows there and I have heard a good many others mention the place. The motorists in this town are finding out about Wiseman and, believe me, it won't be long before you'll see him in one of the best places there is. I've heard he was behind that new garage being built on Main street. You go and see him about that new spark-plug, and if he hasn't got them, I'll buy your lunch tomorrow."

There was nothing more said about the matter right then. Being interested in that Hot-Top spark-plug, be-

cause if it would do what they claimed, my engine needed it, I trotted around to Wiseman's place that afternoon. It certainly was back, out of the way, though it was a lively enough looking place when I got there.

Just inside the office, where he could see into the shop and into the street, Wiseman sat at a big desk with a pile of magazines and trade papers in front of him—and he was diligently going through the advertising pages of one of them. As soon as I saw him, I knew him, because we often

look a little foolish, but let me say that not the least of my work is going through the big magazines and weeklies and the automobile trade papers as soon as they are out."

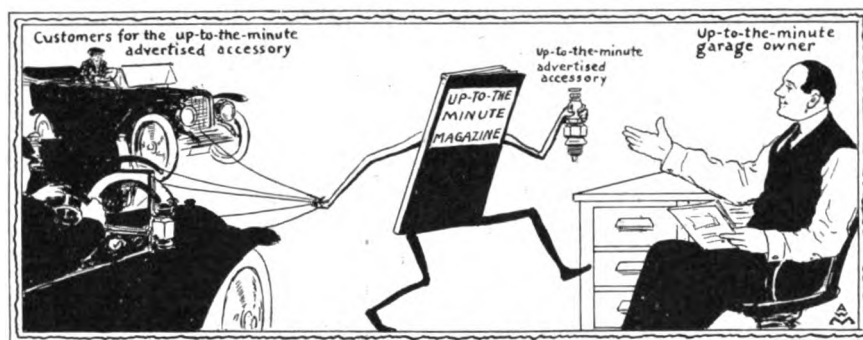
"It sounds pretty easy," I suggested. "Does it have anything to do with the way you've built up your business? They tell me you are the most up-to-date garageman in town, even if you are off from Main street. A friend of mine told me today that you are the only man in town who is always right on the job with all the latest things in automobile equipment."

"Your friend is right. I admit it—with proper modesty. And it is because I do have the latest things in supplies and accessories that I'm getting business away from some of the fellows who have better locations and bigger garages than I have.

"When I was getting ready to start in here, everybody told me I was crazy. They said there were too many garages in town already, and most of them in lots better locations than this one.

Well, that's true enough, in a way, but I know there are more cars coming in all the while, to say nothing of the fact that the town is growing, and there are going to be more garages anyway, so why not mine? Anyway, I started in—and I'm getting ahead.

"You see, I'd worked in a garage in this town and I knew something about all the rest of them. I knew they were all right enough in most ways and that they handled good stuff. But I knew that motorists were all the time coming in and asking for new things they'd seen advertised, only to find that nobody had them or knew anything about them. I couldn't see why, if folks want these new things, it wouldn't be good business to have them for sale. I couldn't see any point



Nationally Advertised Goods Lead Customers to Progressive Dealers.

waited at the same street corner for a car during the snow last winter, but I never knew where he belonged.

"Hello, Wiseman," I said as I went in. "I didn't know you were in the garage business. It looks pretty soft, nothing to do but sit at a big desk with a plate glass top and smoke a fine cigar and read the latest magazines."

"Yes, it's a pretty easy life, this garage business," he replied. "I wouldn't trade places with any millionaire. But let me tell you, this magazine act isn't the easiest thing I do, not by a jugful. This is real work. Sit down and take a magazine."

"No, thanks," said I, "I don't read that stuff and I don't have time anyway to read magazines during business hours."

Wiseman flushed up a little as I said that, but he soon broke into a smile and responded: "I know it does

to sending men away when they came to buy goods and spend their money."

"That," said I, "was just what I was talking to my friend about. I was complaining that I couldn't get new things after the advertising had sold me on them."

"I used to talk to my boss about stocking new kinds of things like spark-plugs and horns and spotlights and dash clocks, and I don't know what all, but he always said it was time enough to add a new brand when he had to do it. They all seemed to be like that. They figured on putting in a new thing only when compelled to do it through the overwhelming insistence of their customers."

"It didn't seem to occur to them that when a man wants a new thing, he is very likely to keep shopping around for it until he gets it. And if the garages don't see it that way, the hardware stores do, and when the garage doesn't have the goods and sends a motorist away empty-handed and he finds what he wants at a hardware store, he's going back to that hardware store next time. I want to tell you that if the garages lose the accessory and supplies' trade to the hardware fellows, it will be their own fault."

"I thought I'd try running a garage where a motorist would find what he was after, and that means the advertised things, because it is advertising that sends a man to the garage to ask for a thing he never had before and knows little enough about. So I opened this little garage—I couldn't afford anything bigger or better located—and I started with a large variety of the reliable and well-advertised things, but without any very large stock of any one kind. I aimed to have all the desirable kinds and to order often enough so it wouldn't be necessary to carry much stock of any one kind."

"You know how you feel when you go to a garage to get a certain thing and they don't have it and they tell you how much better some other kind is that they do have? You still wish you could get the kind you came for, and even if you give up trying to get it and take something said to be just as good, you still have that other in mind and are not entirely satisfied. Isn't it so?"

The experience was familiar to me and I laughed, "You know it is," I agreed.

"Well, when it came to stocking up my garage, I couldn't remember the names of all the well-known and advertised lines I wanted, so I took to examining the advertising in the magazines and in the automobile trade papers. I found some old, familiar lines advertised just as they always had been; I found new things by old, familiar manufacturers, and I found announcements of what manufacturers were going to bring out in the future."

"I found that in the advertising pages a man can keep in touch with what is doing in real, salable goods. And when I came to think it over, I saw that the items that sell much in a garage and are not among the advertised brands, are about as plentiful as hens' teeth."

"When a new thing is advertised by a reliable old house, I know I am not taking any chances in stocking it just as soon as I learn about it. The house behind it will make it go—they can't afford to fall down because of their reputation. You don't find fly-by-night concerns advertising in a high class magazine or in a good automobile paper. I figure that if I wait to stock a new spark plug until after the demand for it begins, I am going to have to turn away the first buyers. And if I turn them away, they will go somewhere else and, maybe, they will like that other place so well they won't come back to me at all."

"I watch the general magazines for advertising of anything new I can sell. And I watch the automobile trade journals for announcements of what new things are going to be brought out and advertised and for information of what advertising helps manufacturers supply and for information about new ways of doing things. Why, say! I couldn't any more get along without my automobile periodicals than I could run the place without gasoline. I often learn about advertising that is going to be done for a certain line and have the goods in stock before the advertising appears."

"Your plan seems to have worked out pretty well," I congratulated him.

"It's got to work well. When I get new advertised things, I tell everybody I see about them. I put them on exhibition and I send out circulars about them. I can usually get some good folders from the manufacturer. Some men, when they get a new thing,

put it away out of sight and wait for people to ask for it, and kind of half hope they won't ask, because there is the old stuff still waiting to be sold. I go slow on the old stuff as well as on the new stuff, and I want people to see that I have the new things so they will know I'm an up-to-date garageman."

"You know, everybody is interested in new things about a car. That is why we all stop to read the advertising about them and we wonder what it would do to have them on our car. Just the minute you see some new accessory advertised, you think of it in connection with your own car. You want to see what it is like and you want to try it."

"That's one reason why I'm here," I said. "I wanted to get a set of those Hot-Top spark-plugs they are just beginning to advertise in the Post. I didn't suppose any garage in town would have them, but Johnson said you would."

"Johnson is the son of a prophet, whoever else he may be," was Wiseman's comment. "I knew the Hot-Top advertising was coming because I read about it in the automobile paper so I got the goods and have had them on sale a week."

I saw that Johnson had known what he was talking about. "I don't know as those Hot-Tops will suit me any better than the ones I've got in now, but I believe they may give me just what I've been looking for. It seems to me they may improve on spark-plugs now and then."

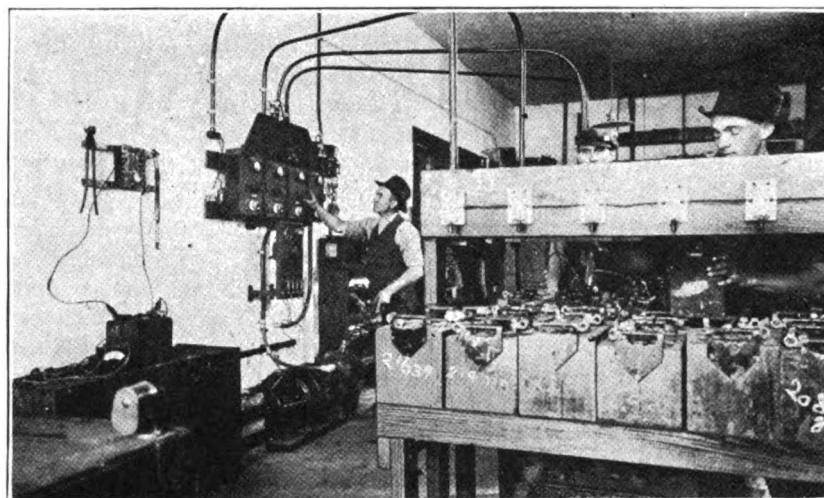
"It is up to the new to be better than the old in some way," said Wiseman, "or it won't get anywhere with the public. Every new brand has some advantage. We are all looking for some improvement for the car. When I couldn't get a man to stop and listen to a selling talk about a spark-plug he knows all about, I can get his ear about a new one. It's human nature to want something better and different."

"I guess I study human nature almost as much as I study magazine advertising. Being a human being myself, it isn't difficult for me to know something about human nature, and I can figure out some of the things a customer will do. I know blamed well that if you were running a garage and wouldn't keep the things I wanted, I would not go without them. I

(Concluded on page 41.)



# B A T T E R Y



# S E R V I C E

Battery Service Is a Very Specialized Brand of Service Involving Care and Forethought—To Insure Satisfied Customers, Repairmen Must Accurately Diagnose a Battery's Troubles, Handle All Repairs in an Efficient Manner and Conduct Their Battery Stations Along Systematic Lines

By Vincent W. Cunningham

The grand objective to be attained in any business enterprise involving the rendering of service is to furnish that service in a manner which satisfies the customer receiving it. This brings about a feeling that he has received a square deal—a feeling which may cause him to return in the future as a regular patron. No man in his right mind ever has work to give to an establishment a second time—if he can find some other place to take it—should his first experience incline him to think that he has received the worst of the transaction.

Battery service is no exception to the rule. It is a more specialized brand of service than some others. It involves a little care, forethought, and often the application of quite a little grey matter to the correct solution and elimination of the difficulty in hand. But there is none, such that the average garage man with a little study, cannot comprehend it.

The objective to be attained, then, in repairing a storage battery is to assure the customer of additional satisfactory service from that battery with the thought in mind of securing a reasonable compensation for so doing.

Profitable battery service can only be obtained through the application of a certain system to the entire routine of procedure—from the time that the battery is checked in for repairs to the moment that it leaves the station—in operation in the customer's car. That system involves:

1. Proper and accurate diagnosis

of the trouble and its extent, i. e., does it affect all cells of the battery, or only one? Many service stations will make no exact estimate of the charges for repairing until the battery has actually been opened up and examined.

2. Efficient and workmanlike handling of the repair. Economy should be practiced in the use of materials replaced and judgment exercised in determining just how many parts to replace—dependent on their functions. For example: it often occurs that a cell will be short-circuited due to a worn separator.

Unless the other separators are nearly new and in perfect condition, it is advisable to replace all of the separators rather than risk another possible short-circuit of the battery. On the contrary, if a little of the paste or composition has fallen out of a plate grid, that is not sufficient warranty for replacing the whole set of plates.

The plates are essentially the battery. The separators are necessary to its operation, but they are not vital parts. The cost of plate replacement is easily a large fraction of the purchase price of the battery, while the separator cost is very small.

Economy of material then advises some replacements but not others, for in the end the customer pays and the amount which he must pay, considering the possible length of life of his battery, must bear some sort of plausible relationship.

The average car owner perhaps

knows less about the electrical equipment of his car, its maintenance and upkeep, than he does about any other part of the automobile. He does know though that he should obtain battery service at the lowest reasonable figure.

3. The systematic conduct of the battery service station requires in addition, to place it on a profitable basis, adequate charges and rates.

Rates must be established which take into account the maintenance of the station, including electric power, depreciation, and breakage of equipment, free service in the way of battery testing, and trouble location, material replaced in the battery and the time of the workman consumed in repairing it. To this must be added the percentage of profit due to the concern.

Adequate rates are never excessive rates. The writer remembers well a stop in a strange city while touring to have a little attention given the battery. The attendant at the station never even so much as tested the cells of the battery but immediately exclaimed: "It will cost you at least \$14 to have that battery opened up."

It is a matter of conjecture just how much the charges might have been had trouble really developed. It is a pleasure to record the fact, however, that this service station was the only one encountered which operated on a profiteering basis.

From the systematic conduct of the battery station just outlined, there result satisfied customers who become

regular patrons and boosters for their local service station.

It is a commendable practice, observed in some places, to give a memorandum to the customer of the reasons for the battery's failure. Many, many times the battery's collapse is due to improper care on the part of the user. Many batteries are habitually operated in a sulphated condition due to lack of distilled water or lack of proper charging.

Such attention is appreciated by the battery owner and accentuates the impression that he is receiving a square deal, for after all any business will succeed that fulfills some want or need and which makes the interests of its patrons its interests.

The purely mechanical side of bat-

teries induce more of his friends to come to the "best mechanic in the business." The largest concern has it in its power to have and hold the same list of patrons year after year. Its attitude towards its customers may be just as friendly and helpful as the smaller stations.

The service station is a great success when it really caters to its trade and this it does in a two-fold manner by doing first class repair work and by infusing in its patrons the thought that there at least they receive dollar for dollar in service.

### **Motor Truck Reliability Contest Postponed Indefinitely.**

A combination of circumstances has made it necessary for the promot-

which confront the manufacturers, it was decided to indefinitely postpone the contest.

### **Ex-Kaiser's Automobile Rebuilt for Use of American Capitalist.**

Word has been received that an automobile built especially for the ex-kaiser and used by him behind the German lines in the big drives of the spring of 1918 is now in this country and is being restored to its original condition for the present owner, George E. Crater, a retired American capitalist, who has a home near Yaphank, L. I.

The car, which was equipped with a Mercedes-Knight motor similar to the Stearns sleeve-valve motor, was abandoned by the ex-kaiser during the German retreat, and its top, fittings and upholstery ruined by a bomb dropped near it by an aviator.

The chauffeur, according to the history of the car, using freedom of motion which the former kaiser's coat-of-arms and his credentials gave him, drove to a point on the Swiss border. Here the machine was acquired after the armistice by Mr. Crater, and was shipped to this country.

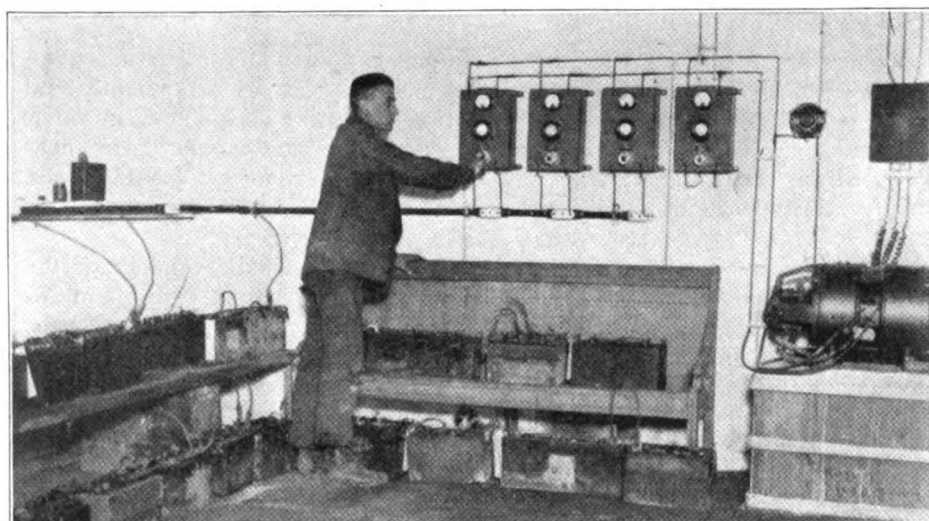
Photographs of the car and original plans obtained from the Krupps are being used to restore the car. Each part of the machinery bears the stamp "Krupp, Essen." The car had a minute kitchen under the driver's seat equipped with a small blue-flame stove, cooking utensils and plates. It is equipped with porcelain, enamel and silver plumbing, running water, a drinking fountain and a reading lamp.

A strip of plate glass 18 inches wide runs around the whole car, level with the eyes of the passengers so that their view in every direction is unobstructed.

### **State of Wisconsin Establishes New Anti-Glare Headlight Law.**

Wisconsin's new anti-glare headlight law which recently went into effect, gives the police department authority to establish "dim zones" in which bright headlights may not be used. It is a state law and requires only that the streets so restricted be well lighted and signs posted warning motorists of the restrictions.

Under the law, only light bulbs of given power are permitted; only a given intensity of candle power may be used and this at specified positions.



Corner in Battery Station Showing Charging from Motor-Generator Type Charging Set.

tery repairing is thoroughly treated in manuals and repair instructions. The operations are not difficult to perform and once the defect is discovered, the remedy is apparent. The opening of the battery, inspection of its electrolyte and plates, the replacement of separators and jars—these constitute the purely mechanical part of battery repair work.

The building up of a well-satisfied circle of customers depends on more than this. As in any other line of occupation, the customer's interests must be considered and looked out for.

No matter how small the shop—be it only a one-man affair, one salesman, one manager, accountant, repairman, all employees embodied in the person of one individual—it is in the power of this shopman to have a clientele of enthusiastic patrons and customers, each one doing his best to

ers of the first national motor truck reliability contest to indefinitely postpone the anticipated demonstration of truck reliability, which was planned to circle the "money belt" of the Middle West in June and July of this year.

As the material situation and freight car situation stand today, it would be almost impossible for some of the eastern manufacturers to get their trucks to Omaha in time for the starting date of the run. It would hardly be fair to ask manufacturers to drive their trucks overland 1,000 or 1,500 miles and then enter them in competition with trucks which were sent to Omaha by freight. This would mean adding a handicap of 1,000 to 1,500 miles to the trucks, which through lack of railroad equipment, were obliged to reach Omaha on their own power.

After reviewing the conditions

# "It Never Ranes but What It Pores"

Three Brakes in One Day! I Lernd Something—Always Get Everything Out of the Box You're Unpackin'—Never Kid a Customer Even if His Face Is Towards You—Don't Pick Up a Packig All Adressst Up and No Place to Go

By Frank Farrington

Deer Pete:

I got it today where the chickin got the ax, rite in the nek. I thought if there were ennything a young feller like me cood do it wood be to unpack a lot of acksessorys and mark em off on the bil and it diddent look like a job that wood taik a grate lot of branes. It took more than I had tho all rite.

There was a big box of stuff from a lecktrick supplize hous and I took everything out of it I cood find and counted em all up and lookt at the bil and there was one packig short that wassent there and it was sum dinkie littel brass things that cost about 10 bux. Ain't that tuff?

Wel I told Persy there was the stuf all but that one bunch and he sed "Where's that?" and I told him it diddent cum and he markt it off on the bill and past it on to the boss and prettie soon the boss cum to me and sed where's that packig that diddent cum? I told him it wassent there.

"Where's the box the stuf cum in?" he askt and I shode him. He sed, "Taik all the exsellsior out and go over it with a fine tooth coam."

So I coamed it like he sed but I diddent do it with a coam, and shure enuf, there was what I had mist, all rolld up tite in a wad that lookt like it was nothing but exsellsior.

The boss stood and watcht me all the time and when I handed him the packig he told me where I get off all rite. Ide bet a wekes wages agenst a hole in a donut that Ile get everything out of the next box the first time. The boss sayz that haf the kix that goze in about shorts in a inouis is for goods thats out on the dump pile in the packing. You cant get me to say it aint so.

But that aint the onlie time I got it today. This afternoon I thought Ide got to where I was a sailsmun. 'Theres a showcase full of acksessorys in our sales rume and I was down behind that fixing things in the bottom of it and a girl cum in and when I stood up she had her back to me and I thought she was the jane that livs next dore to where I liv and that Ime always joshing. I sed, "Hello, tweetie. Hows mommas pet today?"

Gee, she turnd around and it was-

in a garaje or else every time you open your mouth youl put your foot in it. I cant help thinking what wood have happend if Persy or Dazie had of happend to herd that. Spikes bad enuf but he wont tel.

Ive lerned never to kid a customer ennyway. Ile never do it agen even if their fase is towards me. The boss sed to us all one Fridie nite that you mussent joak with strange customers or kid em becaws you dont kno if theyve got enny sents of yumer or not.

Of coarse I had to find it out for myself to see if he was rite.

Pa says it never ranes but it pores and now I kno what he ment becaws today it pored. After lerning 2 very important things Ive told about, I lerned a nuther which was important enuf so I gess Ile remember it.

Theres a baskit we put things in that are going to be mailed and I taik em to the post offis which aint far away. Sumtimes Persy or Bob or sumboddy hands me a packig to go if Ime standing there, insted of putting it in the baskit and thats all rite too.

Today I saw Persy rapping up sum grees cups in a packig and I went out on an errend and when I cum back, the packig was all fixt up with address and stamps on it and I took it and maled it without wating for it to be put in the baskit. Who woodent?

When I cum back from the P. O. Persy stood in the dore and he sed, "Did you taik that packig and male it?" and I sed you meen that packig all rappt and stamp and adressst and he sed yes and I sed yes.

"You littel fule," sed Persy then, "that had a rong address on it and it wassent in the baskit. Trot rite back to the P. O. as fast as your nock-need, skinnie littel legs can Carrie you and



"She Snappt Her Eyes at Me and Sed, 'Why, You Insulting Littel Puppy'."

sent her. It was sum girl I never saw before and she was a peechee too and she snappt her eyes at me and sed, "Why you insulting littel puppy?" and she turned and walks rite out. Good nite!

You cood hav nockt me over with a fether and a pin fether at that. I was just thinking how lucky it was noboddy was in there to heer that when up poppt Spike from behind the limouseen and said, "You insulting littel puppy, when you get that case all fixt up, cum over here and polish up this boddy." And I had to do it.

He diddent say anuther word about it and so did I, but I can see whats going to happen. Whenever Mr. Spike wants me to do ennything for him or enny of his work, heel just say "You insulting littel puppy, cum and do this," and Ile haf to do it.

Whood a thought Ide maik a brake like that? You cant taik enny chanches

get that packig back agen right away."

I diddent like his line of talk and I coodent see why in sam hill heed leev a packig lying around all addresst up and no plase to go if he diddent want it maled, but it diddent look to me like a good time to be asking questions. I just beet it.

I hated to ask em at the P. O. too becaws sumtimes that feller in the window there sumtimes bites your hed off. I told him Ide just maled the rong packig. He sed, "Wel, you needent look so scared to deth about it. It aint exploded yet or ennything." And he got it and kidded me about me being

a ivry doam and I was so mad that I never sed a word and Ide tel the worl I aint offen like that. But this was my third brake in one day and it got my gote, buleve me.

I had it all made up what I wood say to Persy when I got back about having stuf all reddy to male and laying rite there wating to go to the P. O. and then having the rong address on it. It diddent look like very good bizness and I was going to say so. I was going to ask Persy how he got that way, getting the rong packig reddy to male and then jump on me for maling it.

The only trubbel was that when I went around where Persy was, there was the boss talking to him and it wassent the rite sikologicle minnit to ball out mister Persy, so I let it go at that, but Ile get even with him yet. But Ile remember to take 2 thinks next time you bet.

Gee, Pete, this has bin sum day and I hoap tomorrow will be different or Ime going to give up the garaje bizness and be a moovey acter. Ile bet you dont ever get as tired in the drug store as I get in the garaje, Pete.

Your slepey pal,

BILL.

# The Silent Business Stimulators

Copy for Attractive Window and Display Cards Which Appeared in the June Issue Contained Many Stimulating Ideas—Here Is Some Additional Copy That Will Apply to the Automobile Supply Man in His Service to the Trade

By George C. Mason

A silent successful salesman for the shop is an attractive window or display card directing attention to the dealer's business policy, or to the special features of a sale. A card bearing a timely message gives to the passer-by, in a flash, the idea the dealer wishes to convey—and often this is something that an hour's talking to a prospective customer by a salesman will not do.

The wording of cards for these purposes may not be easy for some dealers, but once some suggestions or thoughts are received, it becomes very simple. So the suggestions on this page for the wording of display or window cards may furnish the basis for dealers to develop novel and attention-attracting cards.

**The Royal Road to Wealth and Happiness:**

"For Every Dollar You Spend, Save Two."

Can't Be Done, You Say?

Why, It's Easy!

Just Purchase Your Auto Supplies Here. That's All There Is to It.

Accessories for the Autoist  
Who Knows  
And Must Have the Best.

We Sell These Goods on Merit.  
We Never Ask Acceptance  
On Faith Alone.

For Efficient Service,  
And Lasting Wear,  
You'll Find These Tires,  
Are Always There.

Don't Let the Other Fellow  
Put Your Dollars in His Pockets.  
To Get Your Auto Supplies  
At Right Prices, Get Them Here!  
Put the Dollars You Save  
In Your Own Pocket.

The Purchasing Place  
Of the Value-Wise Autoist  
You Can Save Much on Some Things.  
You Can Save Something On Everything.

When You Purchase  
Your Auto Supplies Here,  
You May Hope for the Best  
And Get What You Hoped For.

Do You Notice Our Prices  
On Auto Supplies?  
You Do.  
Do You Know How We Do It?  
You Don't.  
Well, What's More Important  
We Do Do It.  
You Reap the Benefit.

Come in and Save a Dollar.  
Go Elsewhere and Lose One.  
The Right Goods at the Right Prices.  
That's Us, All the Time.

We Don't Sacrifice Quality  
To Make a Dollar.  
There's a Real Value and a Real  
Money-Saving to You  
In Every Purchase.

Get Your Auto Supplies Here  
And Give the Dollar You Save to  
Charity.  
Then You'll Be Doing Someone Good  
Who Deserves It.

Make This Your Auto Supply Store.  
It's the One Store in Town  
Where Wisdom and Economy Shake  
Hands.

Cultivate the Sensible Habit  
Of Saving  
And Begin Right Now by Buying  
Your Auto Supplies Right.  
Which Means—Buy Them Right Here.

If Your Motto Is—  
"There's None Too Good for Mine,"  
Remember, We Have the Best  
In the Auto Supply Line."

Have Your Auto Look Nifty,  
And Try to Be Thrifty.  
That's Very Easy—  
Just Simply Buy Here.

What's the Use of Losing Trade  
Pushing Inferior Goods?  
We won't do it.  
The Best, and Only the Best  
For Our Customers.

Happiness comes to Those  
Who Seek it.  
These Will Help Make  
The Autoist Happy.

There Is But One True Measure of Value  
And That Is—  
The Capacity for Service.  
You'll Get Full Value  
From Our Supplies.

The Time, Place and Necessity  
Make It Wise  
To Invest Your Money  
In Our Supplies.



# Glimpses in the Garageman's World

It Is Important to Know What Kind of a Place the Other Fellow Has—On This Page Are Exterior and Interior Views of Three Attractive and Conservative Buildings Which Furnish Ideas Adaptable to Any Establishment

## They Operate "The Finest Garage in West Chester."

West Chester, Pa., boasts of a strictly modern garage to which motorists from over the surrounding country flock for service. Here courteous treatment has been made the rule and the proprietors of the Chester County Garage, as it is called, are said to be always ready to lend an ear to those who need their help.

The building was erected several years ago for garage purposes and has been considerably improved since. Today it reaches back several hun-

that locality and numbers many owners of these cars among its patrons.

## A Place for Every Part and Every Part in Its Place.

In the accompanying illustration is a garage stockroom where system is the keynote. Pyramid tool racks were built to care for the tools in general use. Upon the gray surface (the interior of the garage is painted gray throughout) the outline of each tool is painted in bright red. When a workman comes to the rack for a tool, he can tell immediately if it is out, or,

when checking up at the end of the day, the outline informs the checker which tools are missing.

Another system installed for the purpose of keeping everything in its place is the stock bins. These house repair parts and in connection with a card index system, immediately

inform the party in search of any of the parts, of its particular location. The tiers are alphabetically lettered and each bin is given a number.



Neatness Characterizes This Ford Salesroom.

## The Attractive Establishment of a Canadian Dealer in Fords.

A Ford salesroom in Toronto, Can., is shown on this page. Here several attractive features have been added. In the wide display window which runs along the front of the building, growing ferns intermingle with Ford tires and other accessories.

The wide double doors lead into a salesroom where spick and span Ford models are on display. A repair shop is maintained in rear of the building.



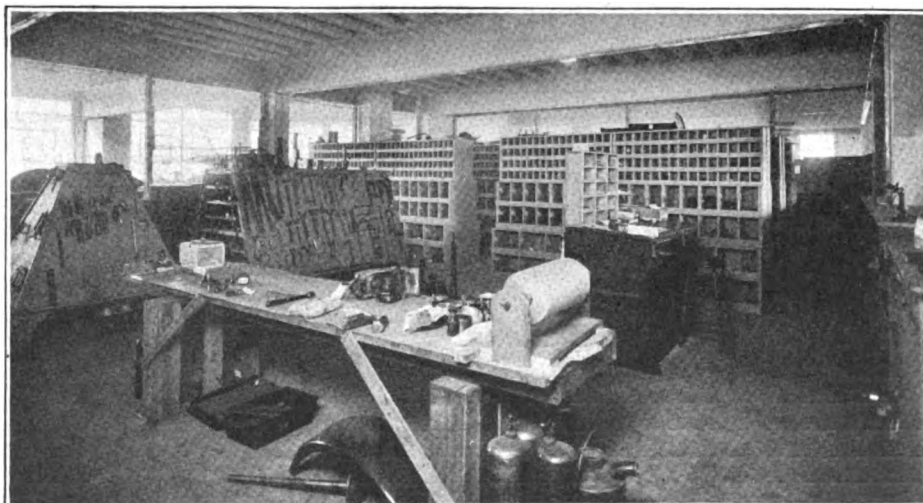
The Chester County Garage Gives Up-to-the-Minute Service.

dred feet and in it are stored numerous cars and vehicles. Two gasoline stations are situated on the curb in front of the building. A free air pump is also readily accessible for passing motorists.

A modern storeroom containing pressed-steel shelves is on the ground floor in charge of a competent man who checks out automobile parts by a system of bookkeeping from the main office in the front of the building. Two clerks are required to take care of the business, which is quite large.

The repair shop is located on the second floor reached by stairs and an elevator. The shop is well lighted and contains all kinds of modern tools. A number of mechanics are in attendance. Day and night service is a feature which draws many motorists.

In addition to being a garage, this establishment handles Cadillac sales in



Note the Systematic Arrangements for Materials and Supplies in This Garage Stockroom.

# Accounting:

Customers' Ledger Forms Are Discussed in Detail in This Article—Two Styles of Duplicating Statement Ledgers Described—Perpendicular and Horizontal Forms—Minneapolis and St. Paul Garage Owners' Association Makes Plans for General Accounting and Uniform Cost System

By J. Newton Boddy,  
Mgr. System and Loose-Leaf Dept., Jeffrey & McPherson Co., Minneapolis

The customers' ledger forms will be considered in this issue. For the garage business we can recommend only the duplicating statement ledger. The chief reasons for the use of this

ledger are that it checks errors of price, extension, or footings. It provides the customer with your identical ledger record.

It cuts ledger posting in half as the

one posting makes out the statement and posts the ledger account. With postings made daily and balances extended, you are at all times able to render the customer a statement. It

| <p style="font-size: small;">We itemize once only—<br/>Save this statement.</p> <div style="text-align: center;"> <br/> <b>J. S. STOVER</b><br/> <small>DISTRIBUTOR FORD AUTOMOBILES<br/>FORD SERVICE STATION<br/>TIRES AND ACCESSORIES, PARTS AND SUPPLIES</small> </div> <p style="text-align: center;">Lincoln, Kans., _____ 191____</p> <p>M _____</p> <p style="text-align: center;">Address _____</p>                                                                                                                                                                                                                                                                                                                                                                                                                        | <p style="font-size: small;">All bills due first of each month.<br/>Interest charged on over due accounts.</p> <div style="text-align: center;"> <br/> <b>J. S. STOVER</b><br/> <small>DISTRIBUTOR FORD AUTOMOBILES<br/>FORD SERVICE STATION<br/>TIRES AND ACCESSORIES, PARTS AND SUPPLIES</small> </div> <p style="text-align: center;">Lincoln, Kans., _____ 191____</p> <p>M _____</p> <p style="text-align: center;">Address _____</p> |       |        |         |         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |      |       |        |         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| <p style="font-size: small;">OVERLAND SERVICE STATION</p> <p style="text-align: center;"><b>O. H. BOND MOTOR CO.</b><br/><small>DISTRIBUTORS OF<br/>OVERLAND AND WILLYS-KNIGHT CARS</small></p> <p style="text-align: center;">Tires Accessories Supplies Parts</p> <p style="text-align: center;">1825-6 Washington      Home 323 Bell 518</p> <p style="text-align: center;">Parsons, Kansas, _____ 191____</p> <p>M _____</p> <p style="font-size: x-small;">We itemize once only—<br/>Save this statement.<br/>All accounts due first of each month.<br/>Interest charged on over due accounts.</p>                                                                                                                                                                                                                               | <p style="font-size: small;">OVERLAND SERVICE STATION</p> <p style="text-align: center;"><b>O. H. BOND MOTOR CO.</b><br/><small>DISTRIBUTORS OF<br/>OVERLAND AND WILLYS-KNIGHT CARS</small></p> <p style="text-align: center;">Tires Accessories Supplies Parts</p> <p style="text-align: center;">1825-6 Washington      Home 323 Bell 518</p> <p style="text-align: center;">Parsons, Kansas, _____ 191____</p> <p>M _____</p> <p style="font-size: x-small;">We itemize once only—<br/>Save this statement.<br/>All accounts due first of each month.<br/>Interest charged on over due accounts.</p> |        |         |         |         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |       |        |         |         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| <p style="font-size: small;">OVERLAND SERVICE STATION</p> <p style="text-align: center;"><b>O. H. BOND MOTOR CO.</b><br/><small>DISTRIBUTORS OF<br/>OVERLAND AND WILLYS-KNIGHT CARS</small></p> <p style="text-align: center;">Tires Accessories Supplies Parts</p> <p style="text-align: center;">1825-6 Washington      Home 323 Bell 518</p> <p style="text-align: center;">Parsons, Kansas, _____ 191____</p> <p>M _____</p> <p style="font-size: x-small;">We itemize once only—<br/>Save this statement.<br/>All accounts due first of each month.<br/>Interest charged on over due accounts.</p>                                                                                                                                                                                                                               | <p style="font-size: small;">OVERLAND SERVICE STATION</p> <p style="text-align: center;"><b>O. H. BOND MOTOR CO.</b><br/><small>DISTRIBUTORS OF<br/>OVERLAND AND WILLYS-KNIGHT CARS</small></p> <p style="text-align: center;">Tires Accessories Supplies Parts</p> <p style="text-align: center;">1825-6 Washington      Home 323 Bell 518</p> <p style="text-align: center;">Parsons, Kansas, _____ 191____</p> <p>M _____</p> <p style="font-size: x-small;">We itemize once only—<br/>Save this statement.<br/>All accounts due first of each month.<br/>Interest charged on over due accounts.</p> |        |         |         |         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |       |        |         |         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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Forms 1 and 2—Illustrating the Perpendicular Duplicating Statement Ledgers, Two on and Four on, Respectively.

is economical, costing less than half what old style ledger leaves and statements would cost. It is the most modern method and is in general use by plumbers, electricians, grocers, department stores, hardware dealers and others. It provides an excellent advertising medium. In all, it is the most accurate system of keeping customers' accounts.

There are two styles of duplicating statement ledgers in common use—the straight duplicating statement ledger and the combination duplicating statement ledger. Of the two, the combination statement ledger is preferable, though it is the most expensive at the start. The original and duplicate statement leaves are placed on the right hand side and the regular or permanent ledger sheet placed on the left hand side. The total monthly charges and credits are posted to the permanent ledger sheet and new balance extended once a month.

This sheet will last five or six years and forms a valuable permanent record of the amount of business done with customers and an invaluable

[illegible][illegible][illegible]

credit reference. The customers' accounts are indexed on the permanent ledger sheets.

Most businesses, however, use the straight duplicating statement ledger because it is the cheaper and because they do not place much value on the sheet as a credit reference or a record of customers' turnover.

The duplicate or owner's carbon record is usually a blank sheet, though this may be ruled and printed the same as the original at a small additional cost.

Many bookkeepers use copying pencils to duplicate statement ledgers. This is very poor practice as, first of all, a pencil statement does not look businesslike, and, second, a pencil does not make as clear nor as permanent a copy as a manifold pen.

The forms illustrated are termed perpendicular and horizontal forms, 1 and 2 being perpendicular, two on and four on respectively, and 3 and 4 being horizontal, one on and two on. The horizontal form is sometimes used three on also.

Where a very small statement can be used, the perpendicular form is sometimes printed three on and six on. For all practical purposes, the two on and four on perpendicular form is the best. Forms 5 and 6 are

**Forms 3 and 4—Horizontal, One on and Two on; Form 5 (top of page) Special.**

In the August issue forms will be

One Chilean editor recently wrote: "In the matter of roads, we are still in swaddling clothes." Some of the newspapers advocate prison labor for road repairs, and others advance the suggestion that road machinery be purchased and operated by native troops. A trail is a "road" in Chile.

**Form 6, Like Form 5, Is a Special Form Recommended Only Under Certain Conditions.**

The committee appointed to report findings are Chairman W. R. Vashro, E. A. Zolle, and L. D. Wilcox. These

The most popular cars for use in the cities are limousines, landaulets, and similar models, with decorative finish and luxurious upholstery. Not

**Form 7 is the Ledger Leaf Recommended for Use in the Combination Statement Ledger.**



# Don't Overlook the Small Things!

## Parts and Material That Are Not Charged Are Often Serious Form of Profit-Losing to the Repairman—Every Shop Should Have Some Plan of Checking Over Its Stock—Some Suggestions as to Practical Methods to Employ

By Nat. M. Johnson

Profit-sharing events occur on all sides and are familiar to everyone. But there is a certain form of profit-losing not so well known, which is a serious item to small repair shops and even large ones that have not provided an adequate check system. This is the loss of parts and material used in repair jobs and not charged to the car owners.

J. Newton Boddy is writing a series of excellent articles on shop accounting for the **AMERICAN GARAGE & AUTO DEALER**. The average mechanic is somewhat prejudiced against anything resembling bookkeeping and small shop owners are likely to feel that too much time is required in carrying out the ideas to make them worth while. These will be inclined to pass up Mr. Boddy's suggestions.

Where each mechanic has the privilege of going to the shelves and selecting the parts he needs, a certain percentage is never charged. Even

things. Quite a sum of money is lost in a year's time just in such little things as bolts, nuts, lock washers, gaskets, cotter pins, gasoline and kerosene used in washing, etc., which are easily forgotten. For example, you buy a box of 100  $\frac{3}{8}$ -inch cap screws. First thing you know, all are used and you are lucky if you find that 50 of them were charged out. You have lost not what they cost, but what you would have charged for them. Don't overlook the small things.

A good idea is to carefully check over every work card when the job is finished. If a crank case was washed out, see that lubricating oil and kerosene are charged. If bearings were refitted, or work you know required cotter pins and none are charged by the mechanic, add them on. Or if a differential or some part is washed and you know gas was used in washing, see that a sufficient quantity of gasolene is charged. Free use of waste is expensive, although I believe most shops now charge this to the car owner and very few owners object.

But do not make a practice of adding little things that were not used or fudging on the amount of grease and oil. Any unfair dealing or cheating is not only dishonest but is a poor business policy and will lose in the end.

A certain acquaintance of the writer did get this habit. He said the customer never kicked at the small things he added, hardly even looked at them on the bill, and picking up a dollar or so extra on every job of any size helped make up for items lost or overlooked. The habit grew from little things to big things until one day he charged for a new set of piston rings when he had used an old set.

The job was far from satisfactory and this man's mechanic having some sort of grievance against him, told the customer what had been done. The result almost put my acquaintance out of business, for it so happened that he tried his trick on the wrong man. He was afraid to fire the mechanic who knew too much. He had to turn

over a new leaf and is now prospering as an honest man should and, I believe, feels indebted to that mechanic.

In our shop, employing six to eight

[illegible]

**Every Work Card Is Carefully Filled Out.**

men, we have found a practical method of keeping track of parts in the use of a small wooden box with a slot cut in the lid. This box is kept in a convenient place near the parts' shelves. By it is a small pad of blank paper and a pencil attached to a chain to prevent it being taken away.

When a mechanic takes any material, he is required to write on one of these slips: First, the date—we usually date several blanks each morning with a rubber stamp; next, the car owner's name or license number; then parts or material; and his initials at the bottom. This slip is then dropped in the box.

In addition to this, the mechanic must list the items on the work card in spaces provided. Each work card is kept on the car to which it belongs, being fastened to the windshield by means of a paper snap fastener.

After work or the first thing next morning, the cards are taken from the different cars to the desk, the parts'

(Concluded on page 41.)

JUN - 1 1920

|                 |       |
|-----------------|-------|
| Quereau - Dodge | 2     |
| Mr Carter "     | 4     |
| Col Davis "     | 2     |
|                 | <hr/> |
|                 | 8     |
|                 | JCH   |

JUN - 2 1920

|                  |       |
|------------------|-------|
| Col. Davis Dodge | 4     |
| Mr Quereau "     | 2     |
| Summers Con Co " | 2     |
|                  | <hr/> |
|                  | 8     |
|                  | JCH   |

JUN - 3 1920

|                      |               |
|----------------------|---------------|
| 479281 - Dodge Sedan | $\frac{1}{2}$ |
| Quereau Dodge        | 5             |
| Kangan "             | 2             |
| Shope - "            | $\frac{1}{2}$ |
|                      | <hr/>         |
|                      | 8             |
|                      | JCH           |

**Each Mechanic Uses a "Material" Slip.**

where the owner or foreman selects and turns the facts over to the men, listing the items at his first opportunity, a good many get by.

Especially is this true of small

# Employers' Liability for Overheating

One of Sanderson's Mechanics Was Prostrated by the Heat—He Claimed Damages from His Employer—Law Provides that Prostration by Accident May Be Found to Be Accident Under Meaning of the Compensation Acts

By Chesla C. Sherlock

"The case, then, is that Jim Dugan, one of your mechanics, was overcome with the heat," stated Judge Prunter, as he removed his spectacles and regarded Sanderson, soberly. "He claims that it was due to lack of proper ventilation in your building, and he thinks he is entitled to some relief from you, either under the common law or under the compensation acts?"

Sanderson nodded.

"It seems to me," he said, slowly, "that if I am liable at all, it should come under the compensation acts. But Jim's attorney is trying to persuade him to repudiate the compensation acts and make an effort to recover damages at law."

The judge's eyebrows lifted. "Ah, so that is the scheme?"

Sanderson remained silent.

"The theory being, I suppose, that more can be recovered at law in an action for damages, than could be recovered under the compensation acts? The attorney, no doubt, is doing business on a contingent fee basis.

"Well, let's see if we can decide just where you stand—

"At common law, it was the duty of the employer to provide his workmen with a reasonably safe place in which to work, and to furnish them with reasonably safe tools and appliances with which to carry on this work.

"The common law imposed other duties more or less closely related to the subject, one of which was the duty of inspection of the place and the tools used so as to save the workman from accidental injury, and also the duty to warn the workman of any dangers incident to the employment, which the employer happened to know by reason of his superior knowledge.

"In the failure of this duty, the employer was deemed guilty of an actionable negligence and the workman could recover damages therefor. But if the workman was acquainted with the business and knew, for instance, that in this employment he would be subjected to excessive temperatures and was likely to suffer or

even be overcome with the heat, he was held to have assumed the risks incident to the employment, because of his knowledge of the employment, and could not recover damages from his employer in case of injury.

"It is not clear whether there was a duty of providing adequate ventilation of shops, factories and the like at common law or not, but it seems reasonably safe to assume that such duty did exist. A place could not be deemed 'reasonably safe' as a working place unless it did have ventilation, for workmen cannot long survive unless they have air in sufficient quantities to sustain life. This being the case, it is not a far step to say that ventilation would be required.

"But the fact remains that this state and the vast majority of the others are not operating under the common law, but under the workmen's compensation acts. Jim Dugan can't repudiate the compensation acts now and bring suit under the common law, if he is within the coverage of the acts. There was a time when he could have done that—shortly after its passage in order to meet constitutional objections—but he didn't do it. So he stands bound by the compensation acts, and any recovery he is entitled to must spring from it and not from the common law.

"The compensation acts, as you already know, Sanderson, are founded upon the theory that an accident causing injury to a workman which arises out of and in the course of the employment, is a compensable injury and should be compensated by the industry causing the incapacity. The existence of the injury being the vital point, the manner in which it arises is of secondary importance, so long as it arose within the employment.

"This, then, fixes an affirmative liability upon employers and this liability will extend to cases where the workman has been incapacitated by reason of a lack of a proper ventilation, or where, by reason of the extreme heat to which he is subjected, he sustains loss of earning power.

"The commission of one state has said: 'Sunstroke (overheating), in order to be compensable, must be the result of extraordinary conditions not common to the requirements of ordinary service. A workman who succumbs to heat while exposed only to the ordinary hazard of laborers in his community generally on a hot day, should not be encouraged to move for compensation allowance. On the other hand, a workman who is stricken in the performance of duty in which unusual heat exposure is involved—exposure not common to the laborers of the community in general—is apt to be well within the limits of compensable injury.'

"The rule recognized at the present time is that any hazard which is general to the community is not a risk arising out of and in the course of the employment, for it is present to all in the community whether engaged in the employment or not. It is clear, then, that if the subjection to heat is no greater in the employment than it would be if the workman were not employed, that no liability under the compensation acts can attach to the employer for overheating or for lack of proper ventilation.

"But if the employment increases the normal hazard or risk in regard to overheating, either by means of the excessive heat generated in the work or through lack of adequate ventilation, then a very different liability arises. The mere fact that the day is unusually hot will not operate to excuse the employer, if the employment has added something to the dangers incident to such risk.

"Because of this common hazard on hot days, the courts were for a long time at loss to know whether or not a prostration could be treated as an 'accident' within the meaning of the acts. But we have gradually come to accept the British decision, in which it was held that 'prostration by accident may be found to be an accident within the meaning of the compensation acts.'"

# Repairing Automobile Tires for Profit

Tire Maintenance Means Profit to Car Owners and Profit to Repairmen—  
This Article, First of a Series, Deals with Repair of Inner Tubes, Appli-  
cation of Tube to Vulcanizer, and Preparation of Puncture for Repair

By M. E. Faber

Regardless of the original cost, a tire, to the average automobile owner, is an expensive proposition. Present tire prices have probably not increased in proportion to the prices on other articles—nevertheless the outlay required for new casings and tubes is sufficient to make it an object for the owner to have them repaired again and again until the last possible mile has been secured.

Everyone who has had experience in tire repair work admits that there are great chances for profit in it. Many repairmen are getting these profits; others are postponing their start because they have the impression that tire repairing is a mysterious, difficult art to learn, or that the necessary equipment is exceedingly expensive.

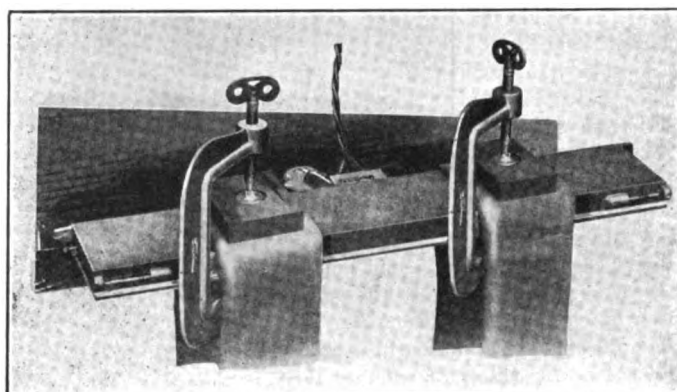
Certainly in these days when it is possible for a repairman to equip himself for all kinds of tire repairing at a cost scarcely more than that of a good sized tire, and since through improved tools the vulcanizing process has been simplified to the point where it is no longer necessary to go to

school to learn the business, it is important for every garageman to prepare himself to get this profitable work.

The customers are coming in the front door every day. It is hardly necessary to ask them for their tire repair work. The overhead in an established garage amounts to practically nothing extra for the vulcanizing plant. Any ordinary workman can, with a very little practice, learn to do the work and make more profit in the time he spends at it than he could in many other lines that are generally considered indispensable in the well-regulated garage.

This and the following articles in this series are written with the idea that they will be helpful both to the garageman who has never undertaken tire repairing and the repairman who wants to improve the class of his work.

All tire repairing is based upon the property which uncured rubber has of welding itself to cured rubber when the two are held together



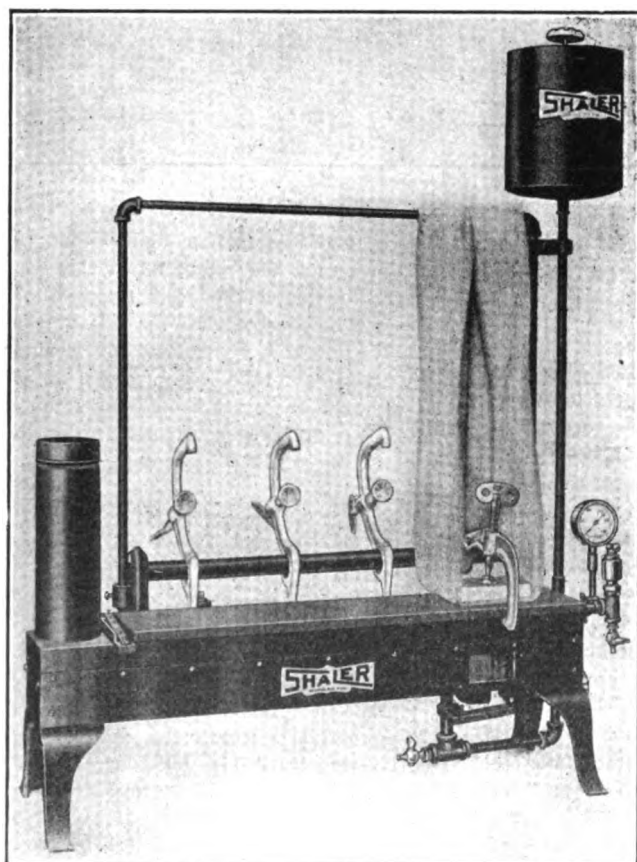
Method of Clamping Tubes on Standard Make of Electric Vulcanizer. Plate Has Temperature Controlled Automatically.

under pressure while the correct degree of heat is applied. The process is very similar to the welding of metals.

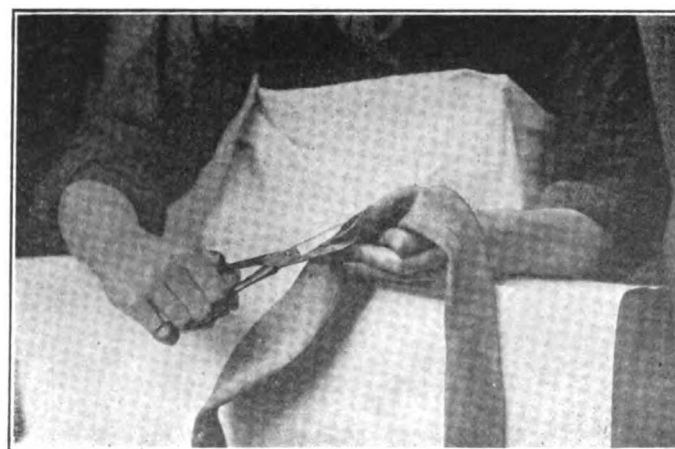
In repairing tubes, then, we literally weld a piece of new rubber into a hole or cut and thereby make a repair that is permanent, as distinguished from patches which are stuck on by means of cement.

The apparatus used for tube repairing is simply a flat plate, heated to the proper temperature by steam or electricity. The source of heat has nothing at all to do with the process of vulcanizing but it is vitally important that the correct temperature be maintained, either by watching and regulating the heat, or in the better class of vulcanizers, by means of automatic control.

A safe vulcanizing temperature is 265° F. Higher temperatures vulcanize more quickly but there is danger of injuring a tube if it is accidentally left on the vulcanizer too long. 265° is about the tempera-



A Simple Type of Steam Vulcanizer for Tubes.



Trim the Ragged Edges of the Tube with Shears.

(Copyright by M. E. Faber.)

ture of steam at 40 pounds, and when a steam vulcanizer is used, the operator generally ascertains the temperature by reading the steam pressure which the gage indicates.

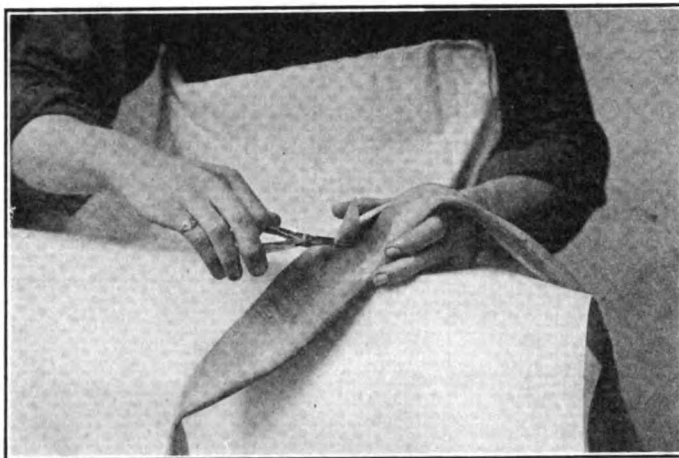
Moisture is absolutely detrimental to a repair and there is no such thing as "moist heat" as the heat from a steam vulcanizer is sometimes called by repairmen who think that because a vulcanizing plate has steam behind it the kind of heat is different than if it were produced by electricity, for instance.

Too high a temperature will overcure or burn a tube regardless of whether there is steam in connection with the vulcanizer or not. The correct temperature will vulcanize perfectly regardless of the heating medium that is used.

In vulcanizing tubes, the repair is prepared in one of the ways described later. A piece of wax paper is laid over the repair and the repair placed on the flat tube plate. The waxed paper is merely to keep the sticky new rubber from adhering to the hot vulcanizer. A block of wood of suitable size is next placed over the tube and a clamp applied so as to give a good firm pressure. The several types of vulcanizers illustrated show the method of clamping.

The tube is left on the vulcanizer for a length of time dependent on the size and thickness of the repair, and when removed and cooled, is ready for use. If repairs are properly prepared, there is no danger of the tube sticking together on the inside, because the inside of the tube is covered with bloom, or free sulphur, that will not incorporate into the repair.

In the case of very large repairs, it is easy to avoid even the possibility of such



Insert Inside Patch with Pliers.

trouble by placing a piece of paper inside of the tube to prevent the repair from touching the opposite side. The paper can do no harm if left inside.

Clean the tube thoroughly with clean high test gasoline and coarse sandpaper, or a rasp, for at least an inch all around the puncture; then wipe off the dust with a cloth or waste moistened with gasoline. The success of all repairs is largely dependent on cleanliness. Commercial gasoline as sold today is likely to contain more or less oil and, consequently, may even hinder a repair from sticking as it ought to. If gasoline that is clean and free from grease cannot be obtained, do the cleaning with sandpaper and let it go at that.

If gasoline is used, let it evaporate and then apply vulcanizing cement to the edges of the hole and spread a thin layer around the hole to cover a space as large as a dollar. When this has dried for a few minutes, apply a second coat of cement over the first and let it dry thoroughly.

If the hole is only a very small one, push a little piece of raw rubber into it and then take another piece as large as a quarter and place it over the puncture. Cover with waxed paper and put on the vulcanizer for 15 min-

utes at a temperature of 265° Fahrenheit.

Trim the ragged edges of the rubber with shears so as to leave a slit in the tube about a quarter of an inch wide. Wash and clean the tube inside and out for an inch or more around the cut, using clean gasoline. Roughen the cleaned surface with a rasp. Coat with two layers of cement allowing each to dry separately.

Insert into the tube an inside patch of one-side cured rubber by folding and setting in place with pliers as shown in the illustration. The uncured side of the patch comes next to the hole in the tube and the cured side prevents the repair from adhering to the opposite side of the tube.

Next fill the cavity with strips of raw rubber, pressing each down firmly so that the edges of the raw rubber are stuck to the edges of the tube all the way around. Finally roll the repair lengthwise and crosswise with a stitcher, which is a small toothed wheel that is made to insure all of the repair being firmly united to the tube.



Roll the Patch with Stitcher.

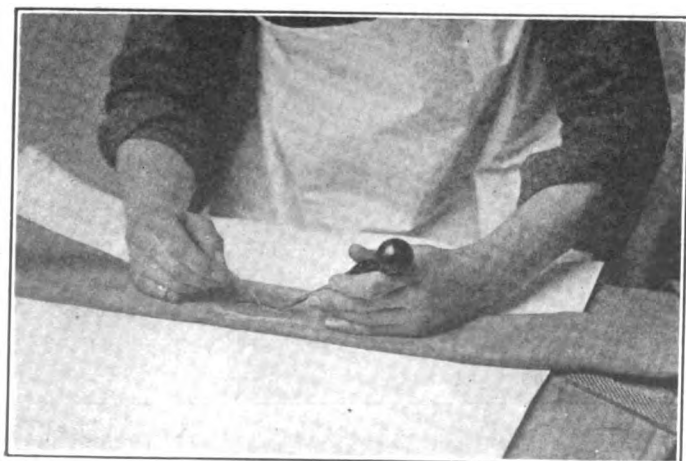
There is practically no limit either in length or area to the size of repair that can be made by this method and the finished repair will be as strong as the rest of the tube. If the repair happens to extend partly around the tube, it is prepared all at once although the vulcanizing process may require two or three settings in order to get all of the repair into contact with the vulcanizer.

### More Accidents Due to Other Causes Than to Automobiles.

Wherein really lies the blame in case of injury to a pedestrian by a motor car?

In going over some of the statistics compiled by the National Safety Council, it is found that the greatest number of deaths from any one accidental cause comes from falls, the rate being 14.8 for every 100,000 people. Railroad accidents and injuries show 11.5 and 9.1 per 100,000.

With automobiles the rate is 8.9 per 100,000. It is true that the number of accidents due to motor cars in any way has risen because of the greatly increased number of cars in use.



Fill the Cavity with Strips of Raw Rubber.



# Trouble-Shooting the Carbureter

The Carbureter and Its Delicate Working Parts Are an Important Factor in Motor Efficiency—Repairmen Must Be Able to Make All Sorts of Repairs on Short Notice—Kinds of Tools to Use and Ways to Handle Various Jobs

By J. N. Bagley

There are a great many car owners who do not realize the value of a perfect working carbureter; neither do they realize the delicacy of the little working parts inside, such as the float, float valve, needle valve, float arm, etc. To the average user of the motor car, the carbureter is a sort of a mysterious box having a lot of something in it that won't bear monkeying with. Because of the fact that many users "screw" their carbureters, it behooves the repairman to be in position to make all sorts of repairs on very short notice.

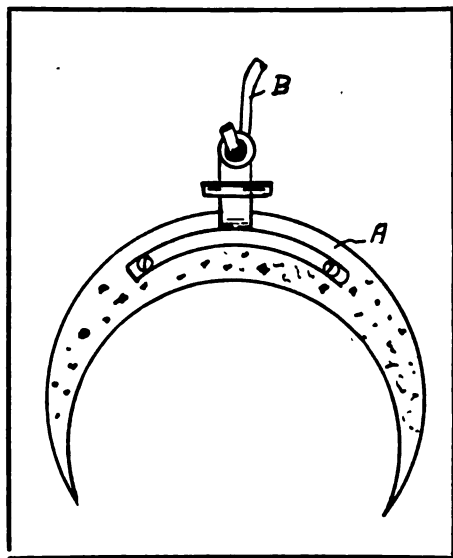


Fig. 1—Removing Leaky Cork with Float Arm Attached.

The repairman should be in position to tell by the sound of the motor just what the carbureter needs in the way of repair or adjustment. This at first may seem a little absurd, but nevertheless it can be done and done quite successfully if particular attention is paid to the motor working under different conditions. A man to be an all around "trouble-shooter" must know the carbureter from A to Z, so to speak, for it is safe to say that 80 per cent of car trouble can be traced to improperly adjusted carbureters.

An instance is recalled where a traveler not so very long ago came to the shop early in the morning—in fact, before we had scarcely opened for business. His motor was skipping and missing so badly it would hardly run on low speed, and the black smoke was rolling out the exhaust, resembling somewhat a threshing engine trying to make a grade just after it had been stoked with a fresh charge of coal.

He told me that he had been having trouble with his engine and had found no

one who seemed to do him any good, except to relieve him of his cash. I told him we were in business for the same purpose, but we always tried to give the customer something for his money, and to just show him we meant business, we would take his job and make the engine work or receive no pay.

This seemed to suit him pretty well for the little smile on his face began to broaden and his eyes twinkled as he remarked: "There she is—she's yours, go to it!"

I started the motor up and got into the car and drove a little way down the road to determine just what she needed. I had not gone more than a few rods until I knew for certain that it was a bad case of carbureter trouble. It would hit and miss and run pretty much as though the brakes were set. After a little coaxing, it would continually gain speed, on a down grade, until it ran fairly well, hitting on all four.

When I opened the throttle wide, it would choke up and almost quit firing until I released the pressure on the throttle. I tried to adjust the needle valve but could get no results. I also noticed that the carbureter leaked when the engine was not running, which indicated that the float valve was not checking the flow of gas from the supply tank.

The needle valve could be screwed down entirely and yet the engine would run along just as if nothing had happened, which showed very clearly that the needle valve, or the needle valve seat, was defective and needed attention.

I then tried to reduce the mixture by giving more air through the air valve. This affected the running a trifle and the car went back a great deal better than it came out. I returned to the garage with the machine, removed the carbureter from the car and took it entirely down, only to find it was practically a wreck and almost beyond repair.

Not having a carbureter in the house, it was up to us to make the necessary repair and set the traveler on his way. Everything that one could mention was wrong with this carbureter, from float to pipe line, and the following will give a very good idea of the way we handle carbureter jobs of the various kinds.

## The Leaky Float.

The leaky float is a source of annoyance even though every other part of the carbureter is in working condition, for it is a waste of gasoline and many times causes the gasoline to rise so high in the float

chamber that satisfactory adjustments cannot be made with the needle valve.

Some of the floats are made of cork and shellacked, while others are made of light sheet brass and the seams soldered. In case

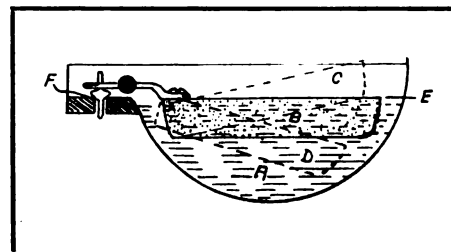


Fig. 2—The Adjustment of the Carbureter Float for Height.

the shellac becomes cracked, the cork takes up the gasoline, becoming heavy enough to sink, holding the float valve open, thus permitting the gasoline to flow through continually. The metal float may be cracked at some of the seams allowing the float to fill with gasoline and sink to the bottom.

To repair the leaky cork float, it is but necessary to remove it from the carbureter, with float arm attached as shown in Fig. 1, and hook a wire through the eye so that it can be handled without touching the shellac after it has been dipped.

The first thing necessary is to remove all the moisture in the cork. A very good plan is to place it in some sort of an oven for a few minutes. After it is entirely dry, remove all the old shellac with double O sand paper and it is ready to re-shellac. Take a small open vessel which will hold the float nicely and fill it with just enough orange shellac to permit of the float being entirely submerged. Dip the float into the

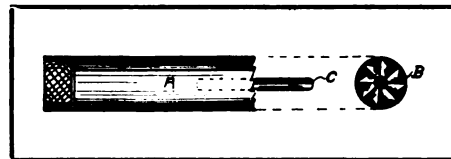


Fig. 3—Handy Tool for Repairing the Float Valve Seat.

shellac and leave it for about three to five minutes when it can be taken out and hung up to dry in the sun, or some warm place.

Do not use a brush to put on the shellac. All cork is full of small holes that cannot be filled nearly so well with a brush. If these small holes are not filled, the gasoline will seep in and the same old trouble will be experienced.

As just directed, hang the float by wire B, in the sun, out of the dust and wind, and let it dry until the shellac is hard. The

small metal arm attached to float *A*, should be left on during the shellacing operation if possible, as the shellac creeps under, making it a perfect joint.

#### Adjusting the Float for Height.

It is very essential that the float be properly adjusted when replacing it in the float chamber. A good plan is to turn the carbureter bowl upside down after the float has been placed and note the position of the float when the float valve is seated. It should be adjusted so that when the valve is seated, the float will have a position

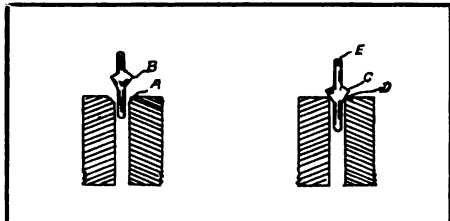


Fig. 4—Float Valve and Seat Before and After Treating.

as shown in Fig. 2, at *B*. In other words, the float should be in line with the sides of the carbureter bowl.

There are times, however, when it will be necessary to vary this adjustment a trifle. This can be done by bending the float arm either up or down as the case may be. However, in most cases, the straight line method will be found sufficiently correct to get very good results when the other adjustments are carefully made.

Should we place it as shown by dotted line *D*, the gasoline would rise in the bowl but a very little when the float valve, *F*, would be seated and the level would not be high enough that a mixture sufficient to run the car could be had. On the other hand, if the float was adjusted as shown by the dotted line, *C*, and the float valve

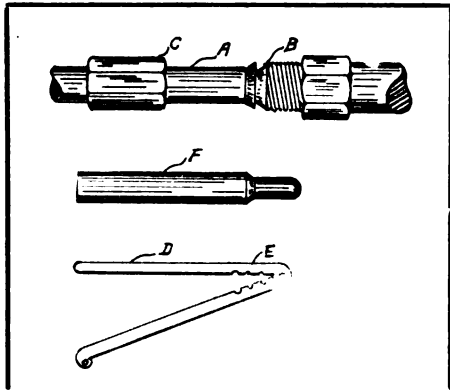


Fig. 5—A Hard External Leak to Stop and Tools for Repairing It.

seated as at *F*, the gasoline level would be so high that it would overflow the top of the spray nozzle and the float never would close the valve. Therefore the first thing to look to is the condition of the float as well as to its position.

#### Reseating the Float Valve.

Take the country over there are many carbureters leaking that repair men fail to stop, not because it is a difficult task, but

because they do not go at it in the right way. The writer has never yet found a carbureter that could not be repaired, regardless of what the trouble might be.

If the carbureter leaks, it is an indication of one of the three things: The float either leaks; the float valve is not seated properly; or the gasket at the bottom of the bowl is defective and should be replaced.

In case the float valve seat is defective and a new seat is not obtainable, a small tool, as shown in Fig. 3, is used. It is made of tool steel, *A*. The small guide or pilot stem, *C*, must fit the opening and act as a guide for the tool when reseating to prevent it from leaning in either direction, in this way spoiling the seat.

In Fig. 4, at *A* is shown somewhat exaggerated, a worn seat. Instead of the corners being square at the seat, they have worn round from constant service, making a seat so wide that with the least variation of the float valve, the gasoline seeps through. The float valve, *B*, many times becomes grooved from constant service, and it is either necessary to true it up in the lathe or replace it. A sharp seat will hold gasoline much better than a wider one; therefore the argument for the use of the tool which we have just described.

At *E*, in the small float valve, I usually place a small nick to permit of the screw driver being placed, to grind the valve a little in case it is necessary. I never use any compound in seating, just a slight pressure when the bowl is filled with gasoline. Many times, if care is taken in the seating, it is not even necessary to resort to the use of the screw driver to get a perfect seat.

The new finished float valve after it has been trued up in the lathe is shown at *C*, and at *D* is the seat after it has been treated with the tool as already described. Note the sharp square corners where the float valve bears against the seat—one can readily see why it is so easy to stop the leak at this point. To illustrate this more clearly, we might try to stop a flow of water on a board by placing another on top of it.

The water seeps under no matter how much pressure is used, but in case we take a long straight-edge, ground sharp on one side, and place it on the surface covered, the pressure, as compared to the former method, is practically nothing. At the same time, the flow or seepage of water is checked with practically no effort at all.

There are some carbureters, especially the higher priced ones, that have interchangeable valve seats and it is necessary to remove the old one and place the new one in position. There are times when the new seat is not obtainable, and other methods must be used or the car laid up until a new one can be had. Just at this time, the method just described comes in very nicely.

Every time a special tool is needed for:

the repair of some particular make of carbureter, it should be very carefully made and put away after using, for some day it will be needed again for a similar job. It takes a little valuable time to make the special tools the first time, but after they are made they last just the same as other tools.

The writer has some 75 special tools for repairing carbureters alone, all made for some special purpose, for which they answer well. These tools cannot be purchased from the jobbing houses, therefore it is up to the mechanic to either make them or do without.

#### Leaky Connections and How to Repair.

Then there are times when external leaks are a little hard to stop, especially the connection as shown at *B* in Fig. 5.

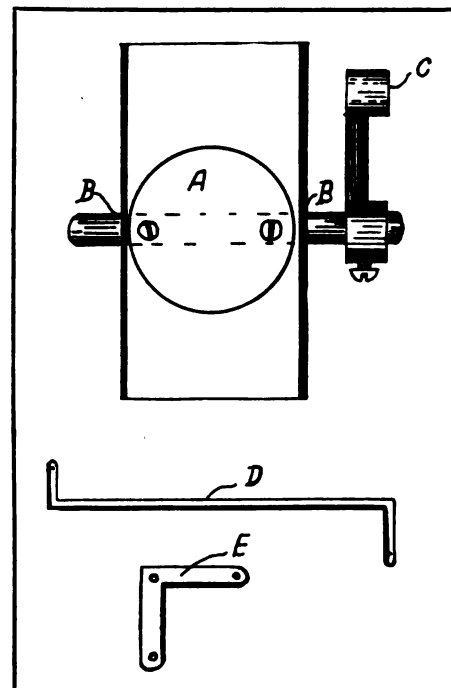


Fig. 6—Loose and Worn Joints in Carbureter Valves.

The end of the pipe is flanged out to fit over a taper nozzle, *B*. The flange may be broken or bent and fail to make a tight connection when the nut, *C*, is screwed onto *B* over *A*.

In this case, a tool as shown at *D* is very useful. It can be made from the joint of an old buggy bow. The openings at *E* extend half on either side and range in size upward from that to fit a quarter-inch pipe. After a small amount of the metal has been filed away, it will grip the pipe tightly enough when closed up on it, so that it will not slip end ways.

A tool shaped at the end as shown at *F* will serve well to form the end of the tube. By holding the pipe with the tool and tapping the tool, *F*, into the end of the pipe, the end of it will be formed to fit the coupling as shown at *B*. This will be necessary, in case the end of the pipe is split or jammed.

It is not a bad idea to use a little soap (Concluded on page 42.)

# About a Mere Matter of Spark-Plugs

Problem of Spark-plugs for Tractors Differs from Spark-plugs for Automobiles—Petticoat and Conical Types—An Explanation of Two Classes of Plug Troubles—Inspection of Spark-Plugs—Those Suited to Tractor Work

By F. H. Sweet

An automobile engine runs at full speed and load during only a very small part of its term of service. A tractor engine is running at full load practically all the time. Because of this, and the fact that low-grade fuels are largely used in tractor engines, the problems of spark-plugs for tractors differs to some extent from that of spark-plugs for automobiles.

As a rule, the use of low-grade fuel means higher compression, higher temperature, and more dirt and carbon. The last item is made still worse by dust taken in while working during the dry season.

It is practically impossible to recommend any one type of plug for tractor work. High temperature engines require a plug with an insulator which is exceptionally good electrically, can stand the repeated applications of high heat and at the same time not have enough of the central electrode exposed to cause overheating, which may induce preignition. An oil engine requires a plug having an insulator with unusually long shorting surface at the firing end.

In spite of the great number of different plugs on the market, there are really just two types—those with petticoat or open insulators, and those with conical or closed insulators. The former can be recommended for the engines which show a tendency to foul up rapidly, while the latter are recommended only in case the extra extension of wire in the petticoat type shows a tendency to cause preignition.

As a rule, the tractor owner and operator is safe in using the plug furnished with the machine by the manufacturer. Failure of one or two plugs on any particular machine should not be considered enough cause for a change to another type of plug. A few defective plugs do get out into service from time to time in spite of the utmost vigilance on the part of the plug manufacturer.

Troubles due to spark-plugs may be divided into two classes: First, cut-out or missing; second, preignition.

A missing plug can usually be de-

tected by shorting from the upper terminal of the plug to the engine with a screw driver. The miss may be caused by a broken insulator. If this is the case, the plug will miss fire pretty steadily both under load and while running idle. The only remedy in case of a two-piece plug is a new insulator and in case of a one-piece plug, a new plug.

The miss may be caused by an insulator which is weak electrically. If this is the case, it will miss when under load, but will recover when running idle. The remedy is a new plug with a better grade of porcelain. In a case of this kind, it is not always necessary to get another make of plug, but to specify to the dealer that the very latest insulator is desired.

The miss may be caused by a fouling or surface short. By this, is meant that a continuous layer of carbon or other conducting material has been deposited on the lower end of the insulator and the spark is traveling through this instead of across the gap. A miss of this kind is usually intermittent for a while, and finally the plug stops firing altogether. The immediate remedy is to clean the insulator, or, in the case of a two-piece plug, by taking it out of the shell and cleaning with gasoline and by scraping if necessary.

Where plugs show a tendency to foul up in this way very rapidly, especially where a wet shiny coating of oil is deposited, it is advisable to change to another brand of oil which, in many cases, will get rid of most of this trouble.

Preignition may be caused by other things than plugs. If severe, it sometimes manifests itself by a spitting back through the intake, but it is always accompanied by a loss of power. What actually happens is this: Some part of the material inside the combustion chamber—valves, carbon, plugs, etc., has become hot enough to fire the mixture before time for the spark.

The piston is not yet at the top of its compression stroke when the force of this premature explosion tries to

drive it back down. The momentum of the fly-wheel carries it over for a while, but power is, of course, lost. In case of preignition, the engine should first be examined to see whether there is an excessive accumulation of carbon and whether there are any particles hanging loose on valves or spark-plugs.

The plugs should be looked over for rough edges on either wire or shell. If a petticoat plug is being used and no indications of rough edges are to be found, it may be advisable to try a conical plug, which very often will overcome the trouble, though it may need more frequent cleaning.

Occasionally the electrode wire shows signs of pitting or burning. This is entirely due to the use of defective material, and there should be very little of it. If it does occur seriously, it should be reported to the plug manufacturer.

Always bear in mind that the tractor engineers have run thorough tests before deciding which plugs to use. The spark-plug they finally decide upon is the one they believe to be the best suited for their engine. When a new plug is needed, it should be the same kind of plug with which the engine was originally equipped at the factory.

In general, the spark-plug manufacturer is prepared to cope with the tractor plug problem, and can furnish plugs to meet all present requirements. However, present day developments in engines and fuels are so rapid that the material on the market is not always the latest obtainable. The dealers are classifying plugs for the various conditions of service, and if the tractor owner will specify clearly just what the plug is to be used on, he should have no trouble getting just the plugs he needs.

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## An Epigram.

Honest opinions, like homely women in street cars, stand longest.—National Refining Co.





# Welding, Cutting and Brazing Practice

In Welding Gear Teeth a Skill and Deftness in Handling Flame and Filler Are Essential—The Three Classes of Gear Tooth Welding to Be Considered—The Welding of Teeth Separately and En Bloc Is Here Taken Up in Detail

By David Baxter

The welding of gears and pinions with the oxy-acetylene flame is much the same as other automobile parts in relation to fusing of the metals and torch manipulation. In fact, the fundamentals of the torch-welding process are about the same on all classes of automobile work. But in welding most of the automobile gear wheels, a little more skill and deftness in the handling of the flame and filler are required. A little bit nicer touch is essential, so to speak.

The torch operator must place the filler metal just right and fuse it almost on the instant, if he would save himself a lot of time and trouble in finishing or machining the new teeth. On the other hand, he has the alternative of welding several teeth together, if he accidentally overmelts one or two.

This article refers principally to the repairing or building-up of worn teeth, since the welding of broken spokes, webs, hubs, etc., is not so difficult; it is more like the welding of other castings or forgings.

In the welding of gear teeth, there are several forms of damage to be considered. Generally speaking, these may be grouped into three classes:

Where only the corners of the teeth are broken or mashed; where the full length of the teeth is mashed; and where the entire teeth are torn out or, in other words,



Fig. 1—V-Block Arrangement for Welding Gear Teeth.

where the teeth are broken off level with the rim.

The first group probably requires the finest skill, since the new metal must be added in very small quantities, a drop at a time, which is to be fused to the tooth without damaging the rest of it, and without permitting the new metal from spreading over a larger area than the damaged part of the tooth. Also, the new metal should conform as nearly as possible to the shape and size of the undamaged portion of the tooth, since it is sometimes a tedious job to file and fit a welded tooth, especially if the teeth are small.

A larger surplus of new metal may be added to the top of the teeth because it is readily ground off, but in between the teeth it should be fairly smooth.

The second group is the same as the first, except that the new metal is added in drops along the whole tooth. In this group, the welding is undoubtedly difficult because of the longer period of sustained effort required. The operator is liable to become nervous when concentrating his skill on the full length welding of a number of small gear teeth. Each drop of metal added to the edge of the worn teeth must be a continuation of the preceding drops—and each one must be thoroughly fused to the tooth.

The welder may use his alternative on the second group, if he chooses, and weld the teeth in a mass to be cut out afterwards. However, that is poor practice unless only a few of the teeth are mashed. Even then, he should not employ this method unless his skill and experience are insufficient to permit him to build the teeth one at a time, for in both of the two groups he may utilize the pressure of the flame to shape and smooth the teeth so they will need but little filing.

In the last group, however, it is probably more advisable to weld the teeth en bloc and cut them out afterwards, because, as a usual thing, where the entire tooth is broken out, only three or four teeth are gone. And where but a few teeth are broken out, the welder can save enough time on the welding to make up the time lost in cutting and filing; cheaper labor can be employed on this.

The missing teeth are welded in a mass thoroughly fused to the adjoining good teeth on each side of the broken section. The melting and attaching of the teeth en bloc doesn't require the time or the skill, but the new metal must be solid and free

from porosity, else the job will have to be done over again. Thus the welding of gear teeth en bloc requires nice judgment and fair knowledge of handling the molten



Fig. 2—Sawing an En Bloc Weld Into the Separate Teeth.

metals in order to keep them clean. Hence, after all, it may not make much difference in what condition the job comes to the welder he cannot slight the work and still make a weld.

There is much of the work of all three classes embodied in the last one, so let us take this for an example and try to make clear the different details of the process as applied to one particular job, part of which is shown in two of the accompanying illustrations. The other illustration is used to indicate the method of arranging the gear for welding when only the corners of the teeth are mashed.

When welding the teeth en bloc, the first thing to do is to thoroughly clean the section where the teeth are missing. All grease and dirt are removed with waste and a wire hand brush until the surface is bright and bare. A handy way to do this cleaning is to play the welding flame over the surface until the grease is burned to a cinder, then scrape and brush this cindery stuff from the surface and from several teeth in the vicinity of the broken section.

This is a cleaning process which effect-

ally prevents any foreign matter from melting and mixing with the weld, either in a solid or gaseous form, to cause porous or hard spots, some of which may not be discovered until the teeth are cut.

The next step in the process consists in arranging the gear for welding. This is handily done by suspending it upon a rod of iron placed across two V-blocks in the manner indicated in Fig. 1. This arrangement permits the gear to be revolved in order that the weld may be kept horizontal and at the same time it prevents the gear from slipping or rolling accidentally when the welder is not ready.

With this device the weld may be made uninterrupted. However, it is not absolutely necessary to suspend the gear, since it may be welded upon a leveling plate just as well, the gear being rolled along the plate to keep the welds horizontal as the work proceeds. Either method simplifies the work as it permits the molten metal to be blown about without piling up on, or running off of the low spots. The welder can know where the metal will flow if the weld is level.

The next step in importance is the selection of the proper welding tip and filler rod. Both should be selected with care, for their choice can facilitate or hold back the progress of the welding. A tip too large will have too much power and will cause trouble in controlling the melted metal. It will melt too much metal too rapidly, thus clogging the weld and causing a poorly-connected fusion.

The flame of a large tip also makes the danger of burning the metal greater. The amount of filler metal is so small, in the first place, that to burn part of it is to burn practically all of it. This is augmented by the kind of metal used in most automobile gears. The different grades of steel of which the gears are made, burn or turn to oxide very easily. If a large welding flame is applied to a small bit of steel, it soon turns the steel to oxide; likewise, if a small flame is held too close or too long over one spot in a steel weld, the metal will be oxidized.

On the other hand, a very small tip will not lend itself satisfactorily to welding automobile gears because it will not furnish enough heat to fuse the weld and at the same time supply enough heat to replace that which is lost through radiation and through conduction to the colder parts of the gear. Some heat also escapes through conduction in the filler rod.

There should be enough heat in the flame to take care of these wastes and still keep the weld melting without burning. A deft manipulation will get both the weld and filler melting in proper unity. A small flame can be used; so can one a little too large, but it is better to choose a size between the two. Then the weld can be melted ready to receive the filler when the filler is melted ready to be applied.



Fig. 3—Chiseling Out the New Teeth

The manipulation of the flame is just as important as the choice of tips. In fact, it is probably the most important part of gear teeth welding—in other words, it can be used to make the weld a success or a failure.

Ordinarily the flame is never permitted to rest long over any part of the weld but is kept continually in motion, revolving in tiny circles over the weld and filler, or being used to paint or wash the molten metal into shape. In gear welding, or the welding of steel, the white cone of flame may be allowed to touch the metal, but should not be held so close that it spreads out or bends back.

The tip of the flame is held close enough to barely lick the weld. This position is varied by raising or lowering the torch to conform to the needs of the weld, as to whether it is fast or slow enough. Sometimes the flame is made to strike the weld at an angle, and sometimes it is pointed directly toward the weld.

At the first symptom of burning, the position or movement of the flame is altered. When the sparks commence to fly farther and faster, it is a sign that the torch manipulation should be changed, because the metal is starting to burn, or that more filler should be added.

Second only to the selection of the proper size flame and its correct handling, is the choice of filler metal. A large size rod can not be used successfully, since it requires a larger flame to melt it than is good for the weld. The larger flame endangers the weld from burning or supplies too much filler metal from the larger rod, thus tending to fill the weld with poorly-connected spots. A rod too small produces the opposite result.

There is no fixed rule for the choice of

filler rods and welding tips, due to the variation in some makes of torch, so the operator may have to depend somewhat upon experiment at the start. A filler rod about one-eighth of an inch in diameter should be right for gears like those shown in the illustrations.

Some welders employ mild steel, or what is termed Norway iron, for welding gear teeth, but this is too soft to be entirely satisfactory unless the teeth are hardened after finishing. A good rod made expressly for gear welding, which may now be purchased from several manufacturers, is a safer proposition.

The proper regulation of the flame is equally important with its manipulation, for an incorrect flame may nullify all other precautions. The flame employed on the gears illustrated, and one that should be used on all gear welding, was the strictly neutral, standard working flame—one composed of equal proportions of oxygen and acetylene. This flame was obtained at the start of the welding and was maintained throughout the entire process.

Had the oxygen been allowed to exceed the acetylene, it would have oxidized the weld, thereby causing porous, brittle metal. If the acetylene had been allowed to exceed the oxygen, the metal in the weld and the filler rod would have been carbonized or rendered hard and lifeless. In either event, the teeth would have been poor when they were machined, probably too hard to file. Therefore, a properly manipulated flame should also be a neutral one.

But to revert again to the en bloc process of welding gears: The neutral flame was held close to the cleaned section of the gear at the roots of one of the adjoining good teeth. Here the flame was revolved in circles about an inch in diameter, which were gradually decreased as the metal commenced to turn red, and as the heat increased, the flame was concentrated to a spot in the corner of the good tooth about half an inch across.

When this spot started to melt, the end of the filler rod was brought in contact with the flame. Then as the spot became fluid, a portion of the filler rod was melted into it, filling the corner perhaps a quarter of an inch deep. As this filling was being completed, the flame was gradually moved along the corner of the tooth, and as gradually another portion of the rod was added to the melting weld. Then the flame and filler were again gradually moved to another portion of the corner. Thus a fillet of new metal was fused along the full length of the base of the tooth.

The flame was then moved sidewise to add another layer back across the gear, adjoining and melting into the first fillet. This layer was made in a continuation of tiny pools, each of which overlapped and became a part of the others. At the end of this layer, the flame was doubled back to add another layer beside the second.

(Continued on page 42.)

# The Garageman's Legal Problems

Decisions of the Courts in Matters of Interest to Garagemen—Cases Dealing with Larceny, Issuance of Permit, Location of Garages, Supplies, Delivery, Rescission of Sales, Welding, and Servile Work Cited

By R. R. Rossing

## Issuance of Permit for Garage.

A hearing by the inspector of buildings on an application for permit to build a public garage, after legal notice by advertisement, was duly held, and landowners, pursuant to ordinance of the city (Ordinances of the City of Pawtucket, c. 166), filed written objections to granting of the application. All parties were represented by attorneys, who were given a week on the conclusion of the hearing to file briefs on the question of including street areas. The decision was reserved. All of this was shown by the record.

Under these facts, a remonstrance filed within a week by a new party owning land within the radius from the garage limited by the ordinance, was not filed within the time prescribed by the ordinance and the hearing having concluded it was held that to render issuance of the permit to build is illegal as against objection of the owners of the greater part of the land within 200 feet.—*Maynard v. Vigeant* Supreme Court of Rhode Island. 108 Atlantic 61.

## Larceny of Automobile from Garage.

When an automobile is stolen from a public garage, the burden is upon the garage keeper of proving that the loss did not come from his negligence.

This is not merely the burden of going forward with proofs, or a shifting burden, but the burden of proving to the jury that the loss did not come from his negligence.—*Hoel v. Flour City Fuel & Transfer Co.* Supreme Court of Minnesota. 175 Northwestern 300.

## Garage Not Prohibited.

A garage is not, as a matter of law, noxious, unwholesome, or offensive to the neighborhood, within covenants of a deed prohibiting certain establishments and all other dangerous, noxious, unwholesome, or offensive establishments, offensive to the neighborhood. The doctrine of *noscitur a sociis* does not justify a finding of offensive conditions, where the evidence shows that the garage is not offensive.—*Goldstein v. Rosenberg.* Supreme Court of New York. 181 N. Y. Supp. 559.

## No Lien Without Consent of Lessor.

A garage keeper obtained no lien under Garage Act (P. L. 1915, p. 556) for repairs and supplies furnished a lessee of an automobile as the lessee was in possession under a lease providing that no repairs

should be made without the consent of the lessor.

Where an automobile was leased in Pennsylvania, under whose laws a lessee is not the representative of the owner for the purpose of creating a lien for repairs and supplies, a garage keeper in New Jersey obtained no lien under Garage Act (P. L. 1915, p. 556) on the automobile for re-

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## REVERENCE FOR THE LAWS.

Let reverence for the laws be breathed by every American mother to the lisping babe that prattles on her lap; let it be taught in schools, in seminaries, and in colleges; let it be written in primers, spelling-books, and in almanacs; let it be preached from the pulpit, proclaimed in legislative halls, and enforced in courts of Justice.—Abraham Lincoln.

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pairs or supplies furnished the lessee without the knowledge or consent of the owner.—*Stern v. Ward.* Court of Errors and Appeals of New Jersey. 109 Atlantic 566.

## Garage Keepers' Lien.

A garage keeper is bound by his contract to keep taxicabs in his garage, and to deliver them to the owner on demand. If delivery is made to a third person or they are stored in another place, it is a breach of the contract of bailment.

Under the statute giving a garage keeper a lien on automobiles stored with him, a garage keeper with whom the owner stored two taxicabs could not, after 32 days only, assign the lien for unpaid charges to another garage keeper, and transfer to him possession of the cars, so as to entitle the second garage keeper to refuse to deliver the cars to the owner until, not only the amount of the original lien, but also his own reasonable charge for storage, had been paid.—*Koroleff v. Schildkraut.* Supreme Court of New York. 179 N. Y. Supp. 117.

## Liability for Driver's Negligence.

It was recently held that P not having been engaged as an independent contractor to deliver goods for D, but having let his truck and driver to D with which D could make his own deliveries, D alone was the driver's superior, responsible to a third person for injury from the driver's negligence in making a delivery. Even if

the ultimate liability as between D and P was, under their contract, on P, that liability was held as not inuring to the benefit of the injured person.—*Finegan v. H. C. & A. I. Piercy Cont. Co.*

## Garage Liable for Defective Weld.

In a truck owner's action against a garage for defective repair work, a conversation between the defendant's representative and the owner as to having a good welder in the town and other circumstances, it was held that a finding was not required that the defendant employed a welder on the plaintiff's behalf, particularly where the plaintiff did not ask the welder's name, and the defendant's bill did not charge welding as a welder's charge to the plaintiff.

It was held that unless a contract requires the personal services of the bailee for repairs, he may have the work completed by third persons; and where a bailee has had welding done by another, and the work was negligently, carelessly, and improperly done, such bailee is liable for negligence, and for the resultant loss of time and use of the repaired car.—*Russell's Express v. Bray's Garage, Inc.* Supreme Court of Errors of Connecticut.

## Hiring Truck on Sunday.

An automobile truck, with a chauffeur, was hired for use on a Sunday under a contract calling for a trip to B. The bailees loaded the truck with goods destined to W, a place considerably farther than B.

Action by the bailor for work, labor and services was one to which the law making contracts for servile work on Sunday illegal did not apply.

## Rescission of Sale of Car.

Where a plaintiff purchased an automobile under a contract, and thereafter rescinded the sale, and, on the seller's refusal to accept a tendered return of the car, stored it in a garage and insured it against theft and fire, and notified the seller that it would be held liable for such expenses, and the storage and insurance continued until after a judgment for the purchaser for the purchase price had been affirmed on appeal and paid, such judgment, in which no claim was made for these expenses, was held not to be a bar to his action.—*Gant v. Cutting-Larson Co.* Municipal Court of City of New York. 181 N. Y. Supp. 581.

# Readers' Questions and Answers

Conducted by E. C. Pohlmann

## Cranking Ford.

In your Questions and Answers Department in the May issue, one man asks why he had to jack up a wheel every morning before he could crank his Ford. My experience is that the average man, driving his car in for the night, reaches down and pulls his brake lever back. Of course, that is all right—but after his motor has been stopped, the brake lever should be put forward again.

The high gear of a Ford is composed of disks. When the lever is pulled back this allows the oil to run between the disk and stiffens over night. This causes a drag in high.

However, if the lever is thrown forward when the car is put away for the night, this will engage the plates and force the oil from between them. Then in the morning when the owner goes to start his car and pull the lever back, the plates are free from stiff oil and the Ford will crank easily.—W. H. C., Nebr.

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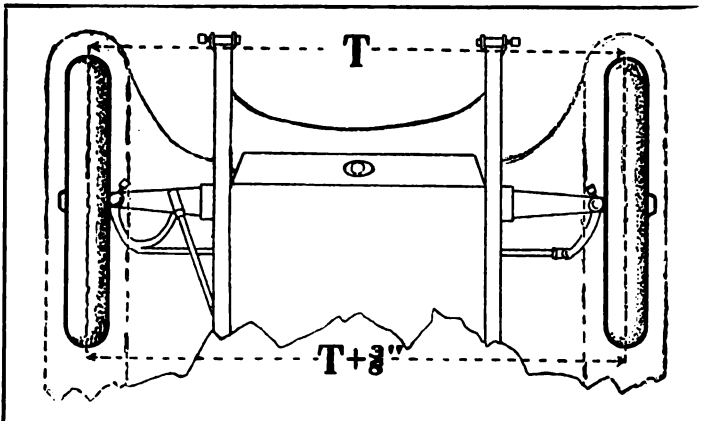
## Aligning Wheels.

How much toe-in should the wheels on the Overland 90 have? Do the rear wheels slip much at low speeds—H. D., Mo.

The distance between the centers of the two wheels, as shown on the accompanying sketch, should be  $5/16$ th to  $3/8$ -inch greater in the rear than in the front. If this is found incorrect, correct it by turning the front axle tie-rod, adjusting yoke on or off of the front axle tie-rod.

To most accurately make this adjustment, raise both front wheels clear of the ground and with a sharp piece of chalk make a mark around the tread of the tire by holding the marker against it while it is being revolved.

Other methods to achieve this purpose may be used. Make a small mark on the tread of each tire and then measure the distance between these marks as the two



Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

wheels are rotated through one-half a turn from front to back.

The results of tests on tire slips made at Brooklands, Eng., on a level racing track of the best sort with plain tires inflated as is usual for racing, show the following percentage of slip of the rear wheels at different speeds:

|     |                                  |
|-----|----------------------------------|
| 0.3 | for a speed of 40 miles per hour |
| 0.6 | for a speed of 50 miles per hour |
| 1.1 | for a speed of 60 miles per hour |
| 1.8 | for a speed of 70 miles per hour |
| 3.7 | for a speed of 80 miles per hour |
| 5.4 | for a speed of 90 miles per hour |

From the foregoing table it is seen that the slip at low speeds (under 40 miles per hour) on a good road is negligible.

\* \* \*

## Rayfield Carburetor Adjustments.

Please publish something in a future issue on Rayfield carburetor adjustments.—T. J. F., Ohio.

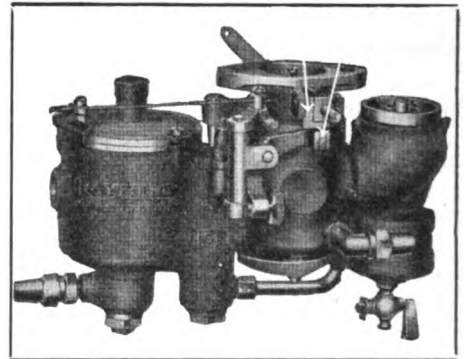
Model G. (water jacketed) and L. Rayfield carburetors are two of the latest types. These models have no air valve adjustments and only two gasoline adjustments.

When adjusting a Rayfield carburetor, bear in mind that both adjustments are turned to the right for a richer mixture as indicated on adjustment screw heads.

Before adjusting the carburetor, be sure that there are no obstructions in the gasoline line, that manifold connections are absolutely tight and free from air leaks, that valves and ignition are properly timed, and that there is a hot spark and good compression in all cylinders.

Always adjust the carburetor with the dash control down. Low speed adjustment must be completed before adjusting "high."

To adjust low speed: With the throttle closed and the dash control down, close the nozzle needle by turning the low speed adjustment to the left until the block indicated by arrow to the right in illustration slightly leaves contact with the cam, indicated by the arrow to the left. Then turn to the right about three complete



Model G Rayfield Carburetor.

turns. Start the motor and allow it to run until warmed up. After the motor becomes thoroughly heated, push the dash control all the way down. Then with retarded spark, close the throttle until the motor runs slowly without stopping.

Now, with the motor thoroughly warm, make final low speed adjustment by turning the low speed screw to the left until the motor slows down and then turn to the right a notch at a time until the motor idles smoothly.

If the motor does not throttle low enough, turn the stop arm screw to the left until the motor runs at the lowest number of revolutions desired.

To adjust high speed: Advance the spark about one-quarter. Open the throttle rather quickly. Should the motor backfire, it indicates a lean mixture. Correct this

The Distance Between the Centers of the Wheels is Shown Here.



by turning the high speed adjusting screw to the right about one notch at a time, until the throttle can be opened quickly without backfiring.

If "loading" (choking) is experienced when running under heavy load with throttle wide open, it indicates too rich a mixture. This can be overcome by turning the high speed adjustment to the left.

Adjustments made for high speed will in no way affect low speed. Low speed adjustments must not be used to get a correct mixture at high speed. The adjustments of Rayfield cannot change the manufacturer claims. Both adjustments are positively locked.

To start the motor when cold, close throttle and pull dash control all way up.

Second: When the motor starts, open the throttle slightly and push the dash control one quarter of the way down.

Third: As the motor warms up, push the control down gradually as required. When thoroughly warm, push the control all the way down. When the motor is warm, it is necessary to pull the dash control only part way up for starting.

When carbureter adjustments are once made, they should not be changed, as the dash control will take care of cold weather as well as cold motor conditions.

Raising the dash control lifts the spray needle and supplies a richer mixture. When it is raised the full distance, a direct passage is opened permitting raw gasoline to be drawn from the fuel chamber of the

carbureter to the motor. The control button or lever should be down for running except when a richer mixture is desired.

Never change nozzles in Model G and L carbureters. Do not change the float level.

A pressure of not more than two pounds is recommended by the manufacturer where the pressure system is used.

The low speed adjustment is to be used only when the motor is running idle and positively must not be used in adjusting high speed. Never adjust the carbureter unless the motor is hot and the water jacket of the carbureter is warm.

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### To Sell Tractors.

I intend to sell tractors this coming year and would like to know the following:

1. What is the cost of keeping a horse on the farm for one year?
2. What is the cost of operating a tractor for one year?
3. What is the minimum size farm on which a tractor can be used to advantage?
4. How many tractors are in use in the State of Indiana at the present time?
5. Can you give the name of the tractor which predominates in this state?—V. H., Ind.

1. The annual average cost of maintaining horses on farms was compiled by the United States Department of Agriculture from investigations during 1910 to 1913 inclusive. These figures are based on careful records of 316 horses on 27 farms:

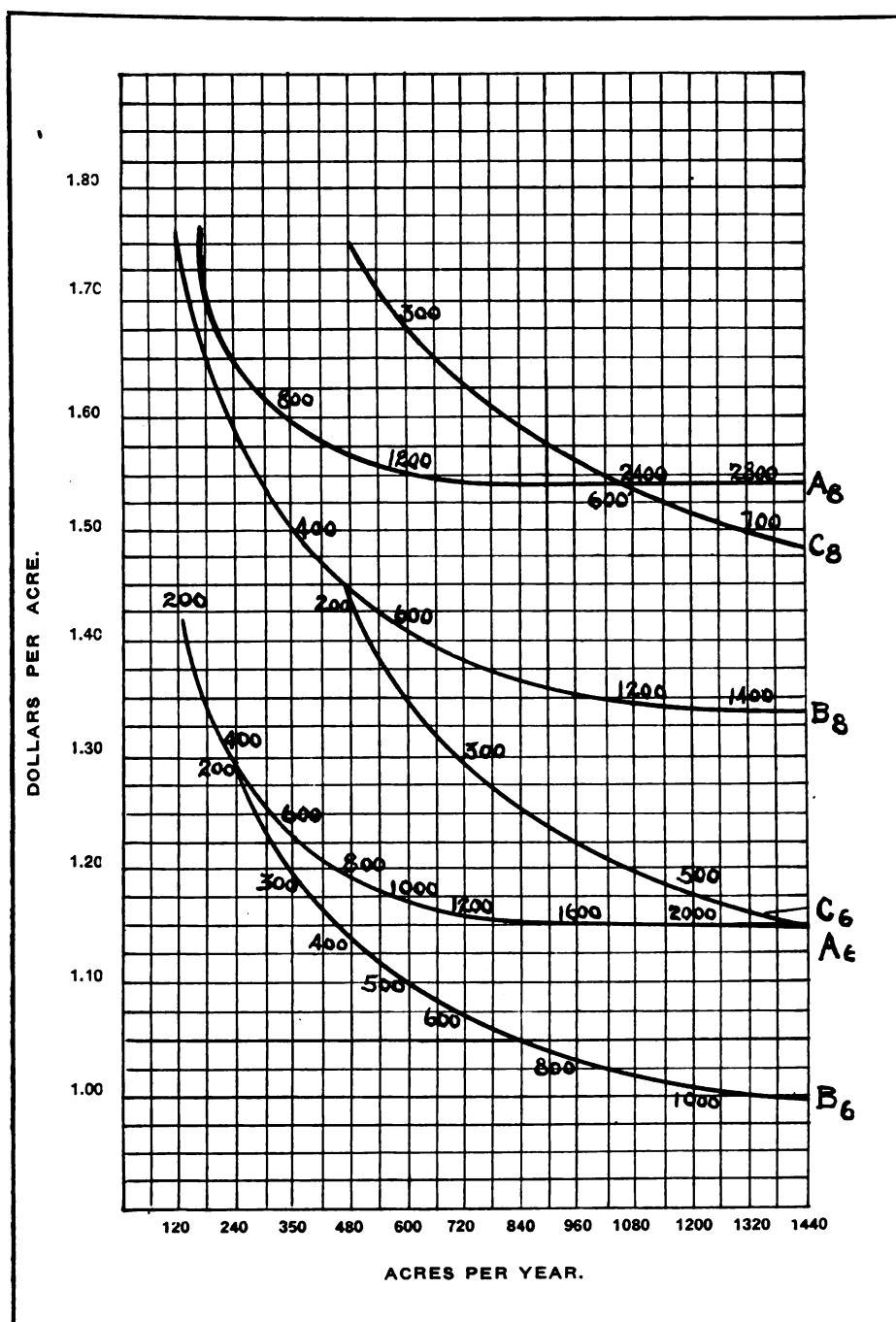
| GROSS COSTS.           |          |           |
|------------------------|----------|-----------|
| Item.                  |          | Per Cent. |
| Feed and bedding.....  | \$78.95  | 58.60     |
| Labor .....            | 21.18    | 15.70     |
| Interest .....         | 8.66     | 6.41      |
| Stabling .....         | 8.37     | 6.22      |
| Use of equipment.....  | 4.89     | 3.62      |
| Shoeing .....          | 2.59     | 1.91      |
| Depreciation .....     | 7.51     | 5.55      |
| Net loss on colts..... | .64      | 0.47      |
| Miscellaneous .....    | 2.03     | 1.52      |
| Total .....            | \$134.82 | 100.00    |

| CREDITS.                              |          |
|---------------------------------------|----------|
| Manure .....                          | \$8.93   |
| Horse depreciation .....              | 2.10     |
| Colt profit .....                     | 1.43     |
| Total .....                           | \$12.46  |
| Avg. cost of keeping, less credit.... | \$122.36 |

The item of bedding is included with feed because on many farms straw was used as a feed and as bedding and, owing to the fact that refuse from the mangers was used for bedding, it was contrary to actual practice to attempt to make bedding a separate item. The costs given in the table are much lower than at the present time, when prices of feed, labor and other items are much higher.

2. The cost of operating a tractor depends on the size of the farm and the cost and kind of tractor.

The average time required to prepare an acre of ground is three hours at a cost of 75 to 90 cents an acre. Besides this, it saves the cost of labor of from two to three men, dispenses with from six to ten



Curves Giving the Cost of Operating Different Size Tractors.

horses and results in an increase of crop from land released from feed growing.

The Department of Agriculture has published the results of investigations of tractor operation in pamphlet form which can be obtained free of charge from Washington. It contains information which will be of value to you. The results of these investigations were based on three sizes of tractors:

A—capable of pulling two 14-inch plows, six inches deep in average soil at a speed of  $2\frac{1}{2}$  m. p. h. Draw-bar horsepower equal to nine.

B—capable of pulling four 14-inch plows, six inches deep at a speed of  $2\frac{1}{2}$  m. p. h. Draw-bar horsepower equal to 18.

C—capable of pulling eight 14-inch plows, six inches deep at a speed of  $2\frac{1}{2}$  m. p. h. Draw-bar horsepower equal to 36.

The estimated prices were: A, \$600; B, \$1,500; C, \$3,600.

The results of these investigations are shown by the curves appearing on the preceding page.

To obtain the cost per acre of plowing a certain area in a year with a certain size tractor, read on the horizontal line the area to be plowed and follow a vertical line through this point until it intersects with the curve representing the A, B, or C tractor. Then follow to left and read on the vertical line the cost of plowing per acre.

The figures along the curves give the number of hours the tractor will be required to work in order to perform the work expected. (The sub-figures on A, B, and C represent the depth of plowing in inches, thus B-6 represents tractor B plowing six inches deep, etc.)

3. The following figures as to the smallest size of farm on which tractors of two to five-plow capacity can be profitably used are based on the statements of about 200 tractor owners located in the state of Illinois:

| Size of tractor. | Minimum size of farm on which it is profitable (owners' estimates). |
|------------------|---------------------------------------------------------------------|
| 2-plow.....      | 140 acres                                                           |
| 3-plow.....      | 200 acres                                                           |
| 4-plow.....      | 250 acres                                                           |
| 5-plow.....      | 320 acres                                                           |

The following figures give the average sizes of farms upon which tractors of different sizes are being used. These averages are based on the estimates of about 200 Illinois tractor owners:

| Size of tractor. | Avg. size of farm. |
|------------------|--------------------|
| 2-plow.....      | 270 acres          |
| 3-plow.....      | 330 acres          |
| 4-plow.....      | 365 acres          |
| 5-plow.....      | 420 acres          |

4. and 5. This information is not available.

## Day and Night Garage.

I have a small garage, 50 by 75, and have been doing repair work only. The garage has been closed during the evening. My idea is that if a man can make money in nine hours, he can make money on a 24-hour basis. This town is about 18,000 population. Why shouldn't there be work all night on trucks and delivery cars that are in use all day and off nights? I figure that although a person would have to pay more for a mechanic to work nights, there would be no rent to pay and the extra lights wouldn't amount to a very big item. I should like your advice on this.

I expect to employ two men and myself in the daytime and two men at night, and intend to have my wife help me with the book work whenever she can. I have a small tool room, or parts room and I am going to get a time clock of some kind. I don't know just what kind is the best. I also like to have work cards punched, because a man working can't as a usual thing, find a lead pencil handy.

I intend to do business on a cash basis. But there are always cases, for instance when a business man has someone else call for his car, when there is bound to be some charging done. I like the idea of "no verbal word goes"—everything to be written down and hung on the car.

If a job came to more than was expected and the party would not have the cash for a month, I would like to see some form of a note that would bind the party so that one could take his car at any time after the time was up, without going through all the red tape of getting a lien on the car, or if the car had been sold, hold other property, providing it was not mortgaged.

I am figuring on getting work reports and bill heads printed. What is a good book to buy to use for a ledger, the loose leaf or the other, and how would you start out? I also want a book for shop expenses, a book for parts bought, a cash book, and a day book.

I would like to say that the AMERICAN GARAGE & AUTO DEALER is the best of four automotive magazines that I am taking.—A. G. C., Okla.

Your idea as to operating a garage day and night is sound fundamentally, for you have your equipment idle over half of the time when you are operating only during the day—and you have to pay interest on your investment for the full time.

As to whether or not there would be enough work to keep you busy both day and night depends entirely upon your local conditions and you, yourself, will have to be the judge of that. Naturally, business houses having trucks and delivery cars want to have them overhauled and repaired in the shortest time possible. If they can bring them in at the end of the day's work and have the work done on them during the night so that the car will be ready for service in the morning, they surely would be willing to pay extra for that kind of service.

Undoubtedly you have already made some investigations as to the amount of work which you would be able to secure to keep your night force at work. A careful canvass of your prospective customers would serve to indicate what the possibilities in that line would be. You might

find it advisable to operate only during part of the night, say up to midnight, for a time until you have sufficient work to keep both of the men busy all night.

The difficulty with a night force is to get reliable men who will work all of the time and not do any considerable amount of loafing. As you are around during the daytime, you, of course, can check up your day men and see that they do the full amount of work. By laying out the work that should be done by your night force and knowing the time it should take, you will know fairly well whether or not they are really working.

Undoubtedly you have read the articles in the March and April issues of the AMERICAN GARAGE & AUTO DEALER telling of the operations of the L. A. Morgan Co., in Brookline, Mass. The April issue particularly explains the system that Mr. Morgan uses and also shows the kind of forms that he has made out. He answers the questions you ask relative to taking care of work, which upon further examination amounts to more than was at first estimated.

As you are located in a comparatively small place, you should have no difficulty in ascertaining any prospective customer's financial standing and reputation as regards paying his bills. The grocer and butcher are probably as well posted in regard to a man's habits in paying his bills as anyone you could find. If you have any doubts about a customer's ability to pay, it would be well to look him up before you put any great amount of work on his car.

It would probably be rather difficult to work out any form of agreement which would bind the party to give up his car at any time without going through the usual legal forms. The best prevention is to insist upon cash payment, especially in those cases where you are at all suspicious of the ability of the party to pay.

We would recommend that you make a careful investigation of time clocks before you purchase. For the small force that you have it is not necessary to obtain an expensive equipment in that you can probably keep track of the time put on the various jobs fairly well without a time clock, at least until you get your bearings.

Your questions relative to accounting and the books which should be used were referred to Mr. Boddy who is in charge of the accounting department of our magazine. Mr. Boddy states:

"Referring to your shop system, I can offer at present, nothing better than the system outlined in the March issue of the AMERICAN GARAGE & AUTO DEALER. The first requisite for any system is a good sales ticket.

For your bookkeeping records, samples, excepting duplicate statements, have been sent you. To start we suggest this outfit:

(Concluded on page 44.)

# Practical Hints for Shop Mechanics

## To Detect Overheating.

A car owner recently devised an ingenious automatic safeguard against overheating. The ground for the ignition current was made by soldering a copper wire to the top of the rear cylinder. Just as soon as heat enough developed in the cylinder, the solder was melted and the engine automatically stopped.—L. A., Cal.

\* \* \*

## A Ford Engine Kink.

A great deal of care must be taken when tightening the rear connecting rod bearing on a Ford engine, to prevent dropping one of the bearing nuts down into the flywheel case. Even with this precaution a nut is occasionally dropped. A very good method of preventing this is to block the passage in the crankcase with a pad made of cotton waste wrapped in burlap. After the work is completed, it is a simple matter to remove the pad from its place.—G. L. S.

\* \* \*

## Prevent Break Squeaks.

By removing the wheel and band and cutting out a short bit of lining under the anchor, squeaks may be eliminated from the braking system. The section removed may be taken from between the rivets, so that these latter are not disturbed and the lining will be just as firmly held as before.—B. C., Ill.

\* \* \*

## Vernier Calipers as Height Gage.

Very often it is necessary to measure the height of a stud in order to make sure that it has been inserted far enough, or to measure the depth of a drilled hole to

## ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

gage, take the vernier off, turn it, and use as shown in the illustration.

To use the calipers as a depth gage, reverse the vernier and insert the straight end.—H. E., Wis.

\* \* \*

## Cylinder Grinding on Lathe.

The task of boring and grinding motorcycle cylinders is often required of every automobile mechanic, and it is not at all difficult when performed with the aid of a lathe. This device is made in two pieces, all of which, with the exception of the front cover, is one casting. The front cover is a second casting.

It has a diameter equal to the swing of the lathe and is bolted to a face-plate which is used in place of the regular lathe face-plate, as will be noted by the

first be accurately centered and the boring tool inserted; if it is to be ground, it will be necessary to use a special grinding fixture, which can be obtained from lathe manufacturers. For the convenience of the operator it might be suggested that a number of types and sizes are to be had and should be included in the shop equipment.—G. C., Ill.

\* \* \*

## Ford Gaskets.

Carelessness in replacing the manifolds of the Ford car so that the small gasket collars do not make airtight joints, is a cause of trouble often overlooked. It is well to fasten these gaskets in the holes in the manifold by using small pieces of paper to wedge them in and then adjusting the manifold to the holes in the cylinders. This plan obviates dropping them or getting them out of true.—P. D., Mich.

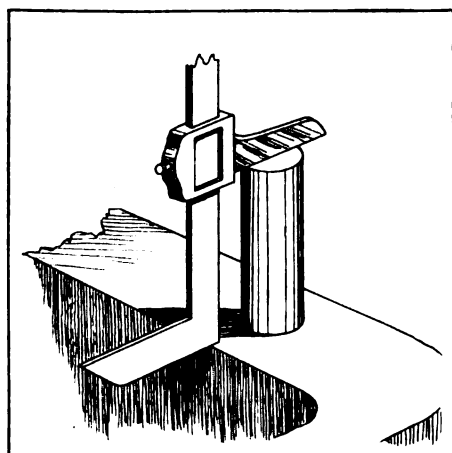
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## Cylinder Head Handles.

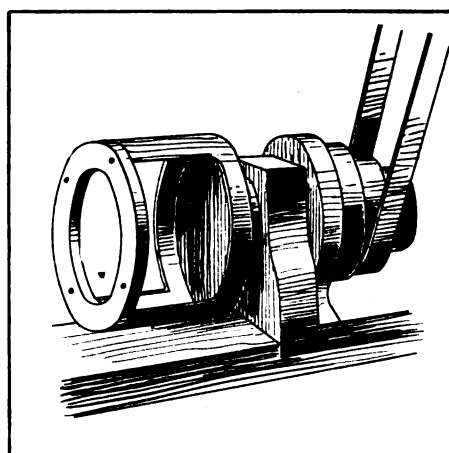
Some cylinder heads are hard to remove even after all the bolts have been taken out. Others are difficult to get hold of, and sometimes the shellac on the gaskets holds them securely. By having a pair of cylinder-head handles at hand, this difficulty is overcome at once. Or if the motor is to be removed from the machine, then the hoist may be attached to the handles and the motor lifted out.

A cylinder-head handle, such as that shown in the accompanying illustration, may be made as follows:

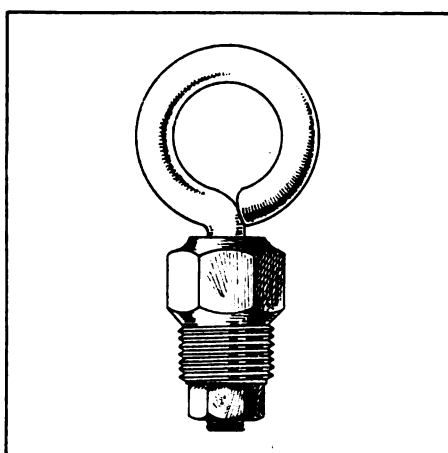
Go to the forge and turn a ring on a piece of  $\frac{3}{8}$ -inch round steel rod. Place the



Using Calipers as Height Gage.



Convenient Cylinder Grinding Device.



Handle for Removing Cylinder Heads.

make sure that it has been drilled deep enough.

To do this and the half-dozen other things that require a height or depth gage, use the vernier calipers. For a height

accompanying drawing. The cylinder is inserted through an opening in the side of this device, and the cylinder flange bolted to the front cover.

If the cylinder is to be bored, it must

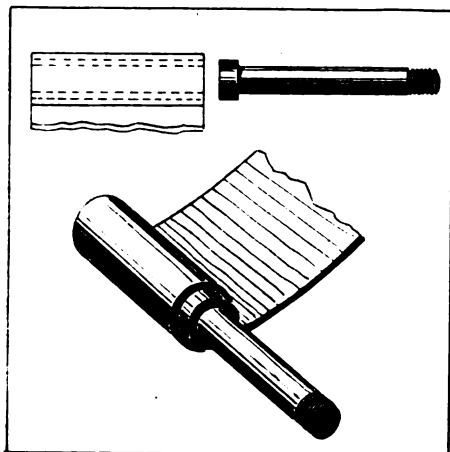
rod through an old spark-plug shell and allow it to come through about one-half inch. Then saw the rod in two and thread for a tap. Place the tap on and grind off any projecting edges so the device may be

turned easily into the spark-plug holes. If desired, the handle may be secured in the plug shell by pouring hot Babbitt around the rod.—R. W. T., Mo.

\* \* \*

### Bushing Remover.

A very handy, spring-bushing remover, as shown in the accompanying illustration, can be made from an old spring bolt. Take the old spring bolt and turn the head down in a lathe or grind it down on an emery wheel until the diameter is slightly less than the outside diameter of the bushing, and use it to drive the bushing out. It



Handy Spring Bushing Remover.

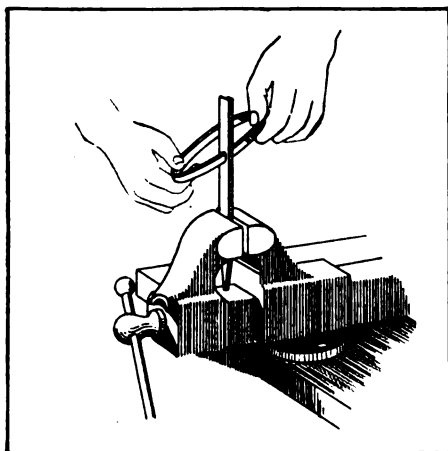
also can be used for driving bushings in by inserting bolt end and pounding the head.—I. A. M., Mass.

\* \* \*

### Filing Ends of Piston Rings.

Place a flat mill file in the vise so it will stick up about six inches. Then grasp the piston ring with both hands and draw it up and down on the file.

In this manner the ends of the rings will



Method of Finding Ends of Piston Rings.

be filed parallel. Try the fit of the ring often as this method files both ends at once.

\* \* \*

### Pump Leakage.

When the water pump begins leaking do not assume that necessarily it is because the nut is too loose. Frequently the nut is not to blame at all, but poor packing is

the real cause of the trouble. Packing for this part consists of candle wick soaked in tallow, heavy twine similarly treated, or special packing material.

After the nut has been turned to press the packing down, do not turn it further as excessive squeezing is apt to damage some part of the body of the pump.—L. T.

\* \* \*

### Balky Starter.

When the starting motor stalls easily and fails to spin the crankshaft as it should, it is a safe bet that either the storage battery electrolyte does not test up to the necessary 1.275 or that the contact points of the line switch are not making the proper contact.—N. D., Ind.

\* \* \*

### Tighten Steering Cranks.

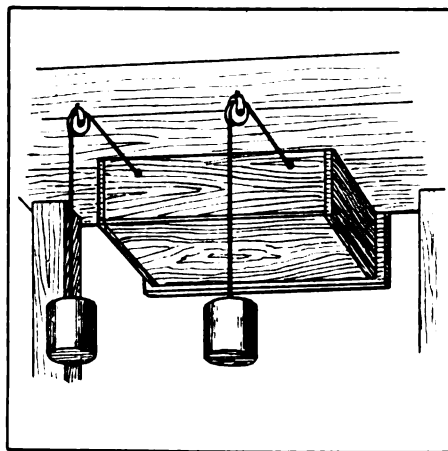
When the bolt fails to take up wear in the square hole in the steering crank, thrust a small steel plate in the slot to keep it open and then strike the arm a sharp blow with a hammer just above the hole. This will be found more satisfactory than the use of shims.—D. N., Mich.

\* \* \*

### Self Closing Drawer.

Chisels, punches, drills and wrenches are generally kept in drawers in the work bench. If one of the men leaves the drawer open, it is liable to interfere with the work of the man at the bench. But the drawers may be equipped so as to close automatically and in a very simple manner as shown in the accompanying sketch.

Small drawers can be closed with a single weight, but extra large ones should have two weights and pulleys. Pulleys with a screw shank are used and are either screwed into the under side of the bench or else in the wall back of the bench.

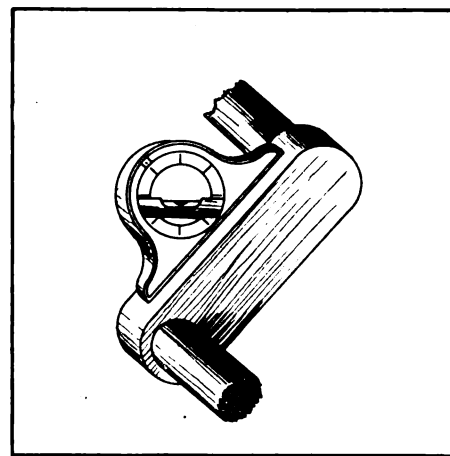


Convenient Self-Closing Drawer.

### Valve-Setting Level.

An ordinary spirit level, such as is used in measuring inclined surfaces, is a very good device for setting the valves in case the timing is given in degrees.

As shown in the accompanying drawing, it should be placed on the crankshaft cheek and the ring carrying the spirit level



Spirit Level Used for Setting Valves.

adjusted to the angle required, for example 45 degrees. The crankshaft should then be slowly rotated until the bubble lies in the center of the glass.—G. S., Ill.

\* \* \*

### Plug Gaps.

When the spark gap of a plug is too great, there is danger of burning out the secondary wire of the coil from the heat engendered by the excessive resistance

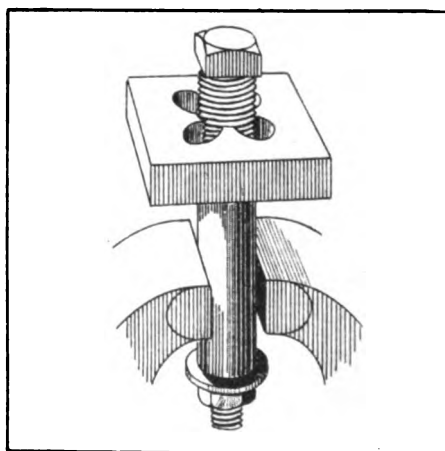
\* \* \*

### Starter for Pipe Die.

When it is desired to cut threads on a very short piece of pipe, difficulty is met in holding the work in a vise and getting the die started.

Sometimes the nature of the work will not permit the use of the regular die stock, and this makes it hard to get the die started.

Short pipe nipples of the size needed may be used for die starters. Run the die onto the threads of the nipple backwards, then place the end of nipple against the pipe end



Starter for Pipe Die.

to be threaded and pass a bolt through the two. Place washer and nut on lower end.

Tighten the nut securely and place end of work in a vise and then the die may be turned off of the nipple onto the pipe with any wrench and will begin cutting at once as the nipple threads act as a force feed and a guide.—R. W. T., Mo.



# From the Truck and Trailer Field

## Established School for Motor Truck Salesmen Suggested.

Are motor trucks selling themselves to the ultimate consumer in spite of the present merchandizing methods as employed by the average retail truck salesman? Can credit for the tremendous volume of sales be given to truck salesmen or must it be chalked up to the operation of the law of supply and demand?

These two questions should be uppermost in the minds of sales executives of vision.

There is no denying the fact that motor trucks today are being more and more recognized as a time and labor-saving adjunct to nearly all vocations. Plans should be formulated now to meet conditions which will confront the retail of motor trucks when the industry returns to normal conditions.

With the exception of one or two keen-visioned truck manufacturers, no real serious consideration has been given by the manufacturer to the most important detail of taking a first-hand interest in the proper training of the salesmen who make up the staff of truck dealers.

It is a question whether the responsibility of training these men should be left to the dealer or not.

There is no denying the fact that the salesman's method of approach today is either so stereotyped or so inaccurate that he is unwittingly discrediting the motor truck industry in the eyes of thousands of business men in different vocations. The best proof of this lies in the exceedingly large number of inquiries which come to the manufacturer, prefaced with the statement "do not send your representative's salesman to see us."

It must be remembered that in a very large number of vocations in which motor trucks can be used, the prospective buyer is himself an employer of a large number of salesmen, merchandising a product in which competition has existed for years; he has made a keen study of salesmanship. As a result, he has adopted methods of salesmanship to insure his share of trade in his particular line, and the salesman himself very often with his indifferent methods of approach and his somewhat lamentable sales arguments, helps to convince this type of merchant that there is something "phony" in all arguments of those who sell motor trucks.

This condition cannot be corrected by

individual manufacturers to the credit of the industry as a whole; there must be some concerted action. The solution, in the opinion of some authorities, lies in the establishment of a "School of Motorized Transportation," where truck salesmen may obtain a 30 or 60-day intensive course on how to retail motor trucks; the course to cover approach, analysis of conditions, proper routing, proper selection of units for vocations, and an accurate mechanical knowledge of their own and competing

## Builders of Business

**The truck is a builder of business. It is an aggressive, efficient means of increasing the scope of business and is not content to passively carry things from one place to another.**

**The story of motor trucks as builders of business forms one of the most fascinating commercial dramas modern business has ever evolved.**

**Motor transportation is a vital, growing part of the nation's business. Economical, invaluable in emergencies, time saving, furnishing greater protection to goods, adding business prestige—a veritable creator of business, is the motor truck.**

**In the past few years, national and even international catastrophies have been averted; crises in the distribution of foodstuffs have been met; businesses on the brink of failure, because of the inability of the railroads to adequately meet the needs of the country, have been saved—by the motor truck alone.**

**In hundreds of lines of business the truck of today is one of the principal factors, because transportation is universally fundamental.**

**From the carrier that was at first dependent upon the business for its scope, it has grown until today it is a factor in determining the scope of the business. Many are the stories that could be told of how the truck has reached out and tapped wide markets, hitherto undeveloped, and reached new sources of supply that had until then been unavailable.**

Service Motor Truck Co.

lines. The course would also give the salesman general information of a constructive benefit to the prospective buyers and operators of motor trucks.

There is proof that such a plan would be beneficial and truck manufacturers encounter it daily. Many truck sales managers wonder why they lose certain sales. Generally it is attributed to certain big discounts alleged to have been given, but in the majority of cases it was due to poor salesmanship on the part of their own representatives.

## Motor Transportation Plays Important Part in Near East Relief.

According to the organization for the Near East Relief, 1 Madison Ave., New York, American motor trucks will be found to have played a most romantic, as well as a most efficient, part in saving the lives of 1,200,000 people in western Asia. Hundreds of thousands of dollars' worth of supplies bought with American money are finding their way to the stricken nation by means of fleets of motor trucks.

Although the camel, wagon train, and even man trains are utilized in the transportation scheme, the truck is the most important. From the big supply station, about 60 miles from Constantinople, food, clothing and other articles are shipped to the interior bases and distributed.

The system of motor transportation built up under the most tremendous difficulties now has a large personnel and equipment. Among the drivers are many former officers and men of the A. E. F. who are seeking further adventure or an opportunity to be of further service to humanity in the Near East.

Their longing for adventure is more than satisfied, since almost every road is infested with bands of bandits who regard a food train as a special prize. When the trucks swing out of the branch stations for their trips into the interior, every driver "packs a gun" and the trains have armed guards, some of them former American soldiers and some ex-Turkish fighters, all heavily armed, picturesquely costumed and fierce-looking enough to satisfy the most exacting.

The trains are made up as a rule of from 10 to 20 cars and there isn't a garage or a supply station along the whole perilous route! Trucks carry their own "gas" and repair necessities, and the truck driver must be a real emergency man, used to quick repairs under all conditions.

## Trailer Laws Latest Factor in Highway Transportation.

State legislatures are taking notice of the entry of trailers as the latest factor in highway transportation and are beginning to enact laws requiring them to be registered and governing their use.

Trailer manufacturers hope that by furnishing information as to types, sizes and construction to aid legislators.

### Uncle Sam's Garage.

(Continued from page 12.)

ing for the curtains. These curtains seemed to serve their purpose most admirably, keeping out about all of the dust and permitting cars to be run into and out of the paint shop anywhere along its length, by simply raising or holding aside one of them.

The dustless condition of the paint room was still further increased by locating the "wash-block" just outside of the paint-room curtains. It was held that the effect of washing at this point and the presence of considerable water in the air and moisture from hose and from floor would still further lay the dust. And appearances indicated that the assumption was pretty sound, for I never saw a paint room, located in a garage, in which there was so little dust as there was in this one!

The cars operated by the department, one and all, seemed to present a new and well-kept appearance which the writer has never observed with other department cars where a large number were in constant use. During a talk with a garage superintendent, the cause of this "freshness" was explained.

It was stated that whenever the repairs or overhauling of any car was to occupy sufficient time therefor, the car was painted, the old paint being removed by burning, scraping and by chemical means as could best be done, and new coats of paint were applied as thoroughly as possible. When only a limited time could be given to a car in the paint shop, it would be "touched-up" and varnished in order to give it the best possible appearance the time would allow. In this way all the cars and trucks were kept to a very pleasing appearance and there never seemed to be an "old" car in the lot.

The repair section of this garage is well equipped with machines necessary for caring for almost any make of car. But, as Fords predominate, the special equipment is largely to handle that make of car. Among the special appliances, was noticed an arrangement for raising the rear portion of a Ford car and for holding it there while the "rear-end" could be changed.

Realizing the frequency with which the Ford rear-ends must receive attention, several of them were at all times kept ready set up, so one could be, at

a moment's notice, placed under a car, the rear-end in use being laid to one side until it could be given the necessary attention.

One or two of the mechanics had the matter of rear-ends for "knitting-work"—that is, when these men were not required for other work, they rigged up some Ford rear-ends and had them all ready for use when required. The special appliance for picking up and holding the back of a car enabled the men to change a rear-end in a very few minutes.

In the stockroom a vast amount of thought and ingenuity had been used in arranging the many parts of several cars so that each and every part could be found and handed out in the shortest possible time.

Naturally, as there were more Fords than other cars to be cared for, the Ford parts held the center of the stockroom if not the "center of the stage." Furthermore, such Ford parts as were called for oftener were placed closest to the window through which stock was handed out. No mechanic was allowed inside the sacred precincts of the stockroom. And drivers of cars? They were never allowed in—hardly to look in if it had been possible to prevent it!

A portion of the stockroom is set off for tires, their keeping and repair. Each car is liberally supplied with tires. In addition to the four in use upon the car, four more are held in reserve, and occupy their own special place in the tire corner of the stockroom, from whence a tire for any car may be taken instantly.

One tire of the four extra is carried on each car, but as the runs are so very short, it is seldom that a driver has to change a tire when out—and he never has to do that or any other repair work in the garage; the mechanics attend to all of that work, and to all the service work too. Just as soon as any tire shows signs of wear it is removed and one of the spare tires put into use while the old tire is being repaired.

But when a tire has been fixed up it is not placed in reserve storage for that car. No, sir! That tire is replaced upon the car as soon as possible after having been repaired and the tire which has been temporarily in use is replaced in storage or as extra upon the car. Furthermore, every mile which the extra tire ran while in temporary use is credited to that tire

and deducted from the mileage of the tire which was being repaired. Thus, an account is kept with each tire as well as with the car and with the driver, and woe be to the make of tire which does not show good results! Bad makes of tires, like poor drivers, seem to have a way of being speedily eliminated from the car-service maintained by this garage.

Not a single article, even down to a cotter pin, is ever given out from the stockroom unless an order therefor has been handed in in exchange for the article in question. The order must bear the name or number of the car, the name of the car driver, but not necessarily written by him, and the order must also bear the name of the shop or gang-foreman who is directly responsible for the requisition of the repair in question.

All the requisitions sent to the stockroom are in duplicate—at least they are made out in duplicate, one being retained by the foreman and later sent with all the garage accounts, to the postmaster. He turns the papers over to the statistician, who juggles the accounts into all sorts of shapes and who can show records giving the life, mileage and condition of each and every tire in the garage, cost of operating each and every car, together with the attitude of each driver toward gasoline, oil and repairs!

The postmaster sends over a stock list the first of each month, which shows what repair parts should be in the stockroom. Meanwhile, the storekeeper and his assistant have kept up a perpetual inventory from the stock purchases and the shop orders. At stated periods, ordinarily the first of each month, the statistician's list is compared with the inventory of the stockkeeper and usually they are found to agree to a screw and to a cotter. But, if they don't, and the storekeeper is "short," he says nothing, but digs right down into his jeans and pays for the missing material, then and there!

The stock labels on compartments of the shelves and boxes in the store-room are each marked with the name and number of the article in that box or compartment, also with the cost thereof, so that there is never any delay in finding the cost of any article that has to be charged against any car. True, not every garage can have the services of a real "honest-to-good-

ness" statistician, but one of them will show a whole lot of very interesting things regarding the expense and distribution accruing from the upkeep of an automobile or a bunch of cars!

### Wiseman's Wise Way.

(Concluded from page 14.)

would get them from somebody else, or I might send to a mail order house. I wouldn't be satisfied to be shown all the time something you said was just as good and that might be or might not be so.

"My plan of studying the advertising pages for new things has made me Johnny-on-the-spot a good many times with new brands, just as it has with the Hot-Top spark-plugs. It was in a trade journal that I saw a notice that that brand was coming along. You see, there's no secret about how I have built up my business. It's just common sense in studying the advertisements."

"It's a wonder," said I, "that more garage men haven't worked along the same line. The idea is simple enough. Anyone can see the point."

"Anyone could see it, but a good many won't look that way. More are seeing it though as time goes on. Just talk with the up-and-coming garage-man in any city and see what he is doing about advertised brands. He is stocking them instead of wasting his time trying to sell brands the customers don't want or don't like. Advertising is hitting a high mark nowadays in helping the dealer, and I'm going to get all the help I can from it."

As I started to go, I said: "You have sold me on your method and just to prove it, I'll come and get you to go to luncheon with Johnson and me tomorrow noon, if you'll go. I think I owe him a luncheon, and I know I owe you one."

"I never refuse a free meal in these times. I'll be ready with bells on," Wiseman consented. "You never do me a favor in letting me talk about my pet hobbies and methods."

### The Small Things.

(Concluded from page 23.)

box is opened and all items are checked and properly charged in a short time.

The proper working out of this kind of a system rests largely with the men. Some mechanics are care-

less or indifferent as to what they use and these are going to lose their employers money, while others will save a third of their salaries by doing what is expected of them.

We use only one style of work card. When a car is brought into the shop, one of these cards is filled in as per the customer's order. Then each line is checked off as the work is completed. The mechanic enters the date, his initials, and the amount of time put in on each job.

For keeping the mechanics' time, small inexpensive memorandum books are used, one for each man, or one book can be used for two or three men. The date is rubber stamped in this book. The mechanic enters under the date the car owner's name and his time for each job he worked on that day. Any time put in cleaning the shop or lost will show in this book as a full eight hours' time for each day must be accounted for.

One book lasts several months and makes a good, permanent record. The books will get soiled and greasy, but mechanics can be trained to wipe their hands before making entries and keep the books as clean as possible.

The time books are checked up similar to the parts' slips. Mechanics are required to put down their time as soon as they are through each job, so if a car is completed and goes out, say in the middle of the afternoon, the time and material can be very readily checked.

Very little labor or material used in our shop is overlooked.

### Chinese Prefer to Ride in Sedan Cars—Propelled by Man-Power.

Fashionable transportation methods in China and the United States are alike in name only. The sedan type of vehicle is the selection of those citizens of both countries who desire comfort and style and some degree of ostentation.

The sedan type of China is a caparisoned chair supported on both sides by long poles and man-power provides the locomotion. This is vastly different from the United States, where the motor sedan is in common use.

If the Chinese aristocrat desires to be transported in state, he is limited to a pace not to exceed four miles an hour and if a two-passenger sedan is used, three miles an hour represents the limit.

### Truck, Trailer, and Tractor to Stop Country Exodus.

Opinions differ regarding the seriousness of the present shifting of population from the country to the city. In the opinion of W. A. Carpenter, of the Acme Motor Truck Co., the solution of the problem lies in the truck, trailer and tractor. In an article on the "Problem of Today" he says in part:

"There are many causes leading up to the condition we are now in—the lives lost in the World War, the influenza epidemic of the past two years, the raise in wages and shorter hours in common labor.

"Other causes for the shortage of man-power on the farms of America are found in unfavorable crop and weather conditions, the high price of everything the farmer has to buy, including farm tools, necessary building replacements, etc., and the general unrest and discontent so prevalent in all parts of America, a state of mind not helped by the stories heard on every side of great wage increases in the cities, and extravagance and reckless spending on the part of wage earners in all of the great industrial centers. This has in many cases whetted the appetite of the farmer for his share of the gold he believes is his for the taking in the city.

"Seeking for happiness in the turmoil of the city on the part of the farmer is akin to searching for the pot of gold at the foot of the rainbow—neither one can be found.

"The writer is convinced that the truck, trailer and tractor will solve the problem. The tractor will enable the farmer to prepare ten acres of ground for corn, oats, potatoes, wheat, etc., as easily and as quickly as he formerly prepared one. The truck and trailer will enable him to pick his market and haul his products in a fraction of the time he could by team, deliver his live stock to market without loss of weight and time, and speed up his work in every way.

"With a farm thus equipped, one man and one helper can not only increase production of food stuffs, but change the occupation of farming to the business of agriculture and from plain every-day, weary drudgery to fascinating, profitable business, clean-cut and wholesome—change it from a more or less humdrum existence to a pleasing and highly remunerative one."

## Trouble-Shooting the Carbureter.

(Concluded from page 28.)

on the threads, when screwing the nut, *C* into place, as, it serves a two-fold purpose: Gasolene will not penetrate soap, and it prevents the nut sticking when it is necessary to remove it again. In case of a broken line, or a crack in a line, a temporary repair can be made with soap. Wrap the line with soap and cover it with tape or cloth to hold it in place and the shop can be reached without any great loss in gasolene.

On one occasion I had the misfortune to break a gasolene lead in two some little distance from home. After trying everything I could think of, without success, I went to a farmer's potato patch, dug a potato, made a hole through it and placed a section of each end of the pipe into the potato and went to town with no trouble and not even a leak.

Copper tubing is more suitable for gasolene leads than brass, as it is quite a little more flexible and will not crack from the constant vibration to which a gasolene lead is subject. If the gasolene pipe is placed in such position as to be subject to wear about the metal parts of the car, it is a very good plan to run it through a small hose and secure the hose to the frame by means of small straps fastened with bolts. A leaky gasolene pipe is not only expensive but dangerous and should not be allowed longer than is absolutely necessary.

### Loose and Worn Joints

Loose and worn joints about the carbureter valves, or about the control levers, give no end of trouble and should be repaired or replaced with new. In Fig. 6 is shown a worn joint, opening directly into the control valve in the manifold. This permits of a constant flow of air above the carbureter and makes it somewhat difficult to adjust the carbureter at a low speed, as too much air is admitted, causing the motor to miss and run unsteadily.

The valve, *A*, should fit the pipe very closely and all joints and levers controlling it should be tight to have a sensitive control over the motor. In case the small rod, *B*, is worn, it should be replaced with a close-fitting one, or in case the hole through which this rod passes is worn, it should be drilled out a trifle larger to true and a large rod used to fill the opening. The eye in the control, *C*, should be round and true.

A very little lost motion in rods and arms as shown at *D* and *E*, will make it next to impossible to have absolute control over the motor at all times. A motor that will not throttle down when idle, uses a great deal of gasolene, as well as wearing the motor and heating it up. A motor should be adjusted down to a very low speed when standing, as a racing motor is usually a short lived motor.

There are a number of makes of carbureters on the market and they all require

adjustment from time to time, but this should be no bugbear, for they all have the same function, the same working principles, and when one is understood, it is an easy matter to adjust them all.

### Adjusting the Carbureter

The motor should be started and the gasolene adjustment changed until the best results are had, and the motor picks up and runs freely. After it has been adjusted running idle, take it out upon the road and note the action of the motor. If it is sluggish and slow to respond, the mixture is a trifle rich and more air and less gasolene should be used. Continue this until the motor will stand no more and pull well.

In case the mixture is over rich, the motor will heat quite readily, the plugs will foul up in a very short time, and there will be a lack of power. In case the mixture is lean, there will be an occasional snapping and popping in the manifold of the carbureter, the motor will miss fire, the power will be affected and the motor will stop when the throttle is closed.

In case the carbureter used is a double jet one, the adjustment will vary a trifle from the adjustment of the single jet. The extra air valve comes into action as the higher speed of the motor is reached. Directly under the high speed valve is a small opening leading from the spray nozzle. As the speed of the motor is increased, the suction raises the valve and admits an extra spray of gasolene and air to be taken to the combustion space of the motor along with the regular spray. This is claimed by some to give more power to the motor and more speed. Whether or not it does remains to be decided by the user, for all people do not have the same opinions of a device of this sort.

We have another type in the model L Shebler, which has met with success and the adjustment differs a trifle from the double jet. The low speed is adjusted in the usual way, with a slow, steady running motor. The next higher speed is adjusted by the little hand on the movable arc operating upon the needle valve as the throttle is opened, thus giving a greater or less amount of gasolene as required.

This hand as well as the high-speed hand works, in most cases, about center way of their range of adjustment. This idea has been worked out quite successfully on carbureters used on motorcycles. An over-rich mixture on a hard pull will many times cause a very annoying knock, known as a "fuel knock." This knock comes from the fact that in trying to make the motor gain speed, the throttle is opened quite wide, and the motor working almost up to the limit cannot handle the mixture that is drawn in.

A carbureter, which is too large for the motor, quite frequently causes a knock of this sort. A carbureter that is too small for the motor will work quite well at a low speed, but at a higher speed will seem

to be held back, yet it will not spit and pop if properly adjusted.

Air admitted above the carbureter, through a gasket or joint, will make a very unsatisfactory carbureter and many times is hard to locate, especially if one is not looking for something of this sort. This is usually noticed in starting, as it renders starting very difficult and, besides, it is hard to get an adjustment at any speed of the motor. Of course, if the motor were running at a certain speed and on a level stretch of ground, the adjustment could be made while running until it would work quite well, but as soon as the speed changed, the adjustment would need to be changed as well.

## Welding, Cutting and Brazing.

(Continued from page 32.)

Thus the entire section was filled, a strip at a time, until the whole surface of the broken part was filled with a layer of new metal about a quarter of an inch deep, carefully joined to the teeth on both sides.

During this proceeding the flame and filler were in continuous motion. The flame was played in tiny circles and arcs over the weld and the filler rod, the filler rod twisting and prodding lightly in the weld. At no time was it permitted to drip onto the weld, since this would tend to carry chilled or oxidized filler into the weld. The filler was kept feeding into the weld beneath the surface; it was, literally speaking, pushed beneath the surface of the fluid weld.

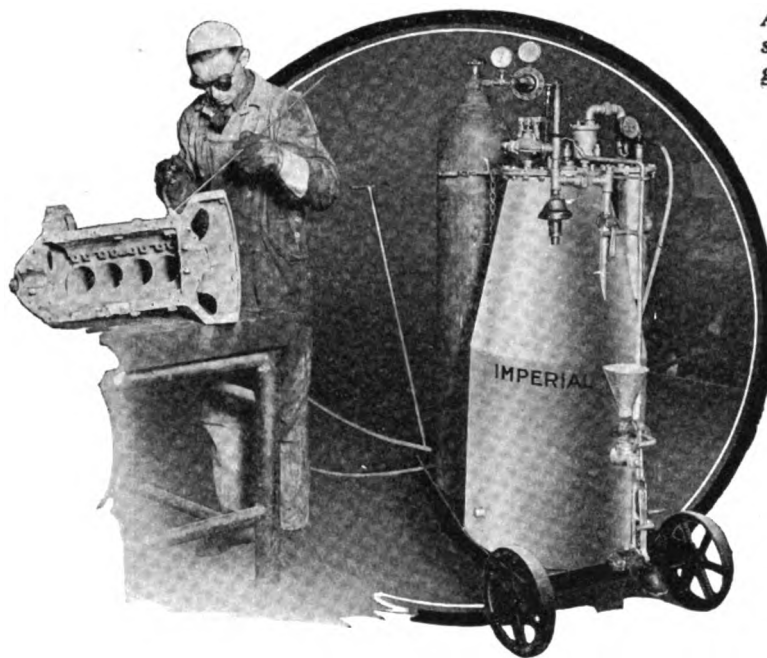
Whenever dross or slag appeared that could not be blown aside with the pressure of the welding flame, it was flicked out with the filler rod. The rod was also used to influence the flow and mixing of the metals, by twisting in that general direction.

No flux was employed on this job. In fact, none is required on steel welding because the melting point of the oxide is below that of the metal and, therefore, the oxide either consumes itself or melts and floats to the surface, where it may be blown or scraped aside.

After placing the first layer in the broken section, the flame was applied to the first filet again where another one was melted along the corner formed by the good tooth and the first filet. Care was taken to see that the second filet actually joined the one beneath it and the side of the tooth. This second filet was added in small connecting portions along the tooth, from end to end.

The process was then repeated back across the gear on top of the first filling, making certain that each pool of metal fused with the lower ones and the surrounding ones. At times the flame was dropped to an angle to blow the edges of the pools together smoothly. Thus the first series of pools was covered by a second layer, from end to end of the section, and the whole section was filled level with the top of each tooth on the sides of it.





*A welding outfit  
should be in every  
garage.*

What an advantage the garage with an Imperial Welding and Generating outfit has!

Repairs are made in minutes instead of days. This delay saving capacity naturally attracts much money making repair work. An Imperial Welding outfit, equipped with an

## **Imperial** Automatic **ACETYLENE GENERATOR**

is remarkably simple—no clockwork, weights or complicated mechanism control acetylene generation. Gas flow regulated by torch-pressure so uniform that no acetylene regulator is required. Made in 15, 25, 50 and 100 pound sizes.

It's easy to operate an Imperial outfit. Our machines are specially adapted to garage uses—and cost the least to operate. Write us for catalog and complete information.

**The Imperial Brass Manufacturing Co.**  
**1224 W. Harrison St., Chicago, Ill.**

Makers of Welding, Cutting, Carbon and Lead Burning Equipment and Supplies

A slight surplus of filler metal was added above the tooth level for machining purposes; also the filled part was filled to give it the proper crown or curve to preserve the outer diameter of the gear. Then the gear was removed from the V-blocks and placed flat upon the table where one side of the weld was gone over.

The flame was played around, over the sides of the weld, or more properly, perhaps, over the end of the new tooth section. The hollow or weak spots were remelted and filled while the higher or rough spots were leveled. These irregularities were doctored with the flame pressure and the filler rod.

The gear was then turned over to bring the opposite side of the weld upward, which was also remelted and cleaned the same as the first side. Particular attention was paid to the corners to be sure the ends of the new teeth would be sharp and metallic. Then the gear was ready for machining.

If the welding shop is equipped with emery grinders or other machines for cutting out the new teeth, this part of the repair is quite simple. However, many welders do not possess these facilities, therefore the new teeth will have to be worked out by hand. This seems to be a very slow, tedious process, but in reality it is not half bad if the mechanic goes at it in the proper spirit. Of course, he must be very careful toward the end of the process to prevent making the teeth too small. If he calipers frequently and works carefully at the last, he can produce an almost perfect tooth.

In this particular case, the welded gear was taken first to an ordinary emery wheel, where the face of the weld was ground almost level with the old teeth both on the edge of the gear and on each side. This saved a lot of hard filing. Next the gear was fastened in a vise with the welded section upward. Then a fine-tooth hacksaw was used to cut the sides of the teeth as shown in Fig. 2.

In this process a slight surplus of metal was allowed on each side of each tooth to provide stock metal in filing to accurate size. The sawing was done straight down to the rim of the gear, leaving the pitch for the finer work of filing. Before sawing, however, careful measurements were made to locate each tooth accurately. Center punchmarks were made to prevent mistakes.

After sawing between the teeth, the next step was the cutting out of the sawed portions. This was done with a sharp chisel having a narrow blade, the operation of which is shown in Fig. 3. The metal between each pair of teeth, or more strictly speaking, between each pair of saw cuts, was removed a thin layer at a time almost to the bottom of the teeth.

These sections were cut out, one after the other, leaving a thin surplus at the bottom to be filed out more accurately. It

was a rather slow process and the chisel was sharpened frequently to prevent mishaps. One little false blow might have ruined the whole job.

When all of the chiseling was finished, the teeth were filed to correct size with a fine flat file, the last layer of each filing being done very slowly and carefully. Then the tops and ends of the teeth were filed flush with the old teeth, and the gear was ready for service.

It does not require much more time to finish teeth welded en bloc, however, than it does to file and fit teeth welded one at a time, particularly where they are located next to each other.

This job could have been done by building up each tooth separately, but it would have taken more time and skill to get the teeth in line and of the correct size. Each tooth would have been built a layer at a time with a slight surplus on top, but there were chances of the new metal being hard spotted, which would have caused lots of grief when filing to size.

These things are much a matter of individual taste and judgment and I am not particularly advising either method. I have merely tried to set forth the advantages and drawbacks of both methods, leaving it to each welder to know his own skill and ability. By one method or the other, these gears should all be repaired; it is wasted material to throw them away.

### Day and Night Garage.

(Concluded from page 36.)

"Two hundred cash journal leaves; 100 general ledger leaves; 100 customers ledger leaves; 100 vendors ledger leaves; 100 expense ledger leaves; 2 top-lock binders, and 4 division sheets.

"If you will procure copies of the AMERICAN GARAGE & AUTO DEALER since May, 1919, you will get full description and instructions in the use of most of the forms."

### Reducing the Fire Hazard.

By Frank E. Morriss.

In a recent safety campaign conducted by the Dallas Automobile Club, at the request of the commissioner of fire and police, it was discovered that very few garage and oil station owners were strictly observing the law with regard to keeping posted the warning signs against smoking. There was also a lack of compliance with the ordinary fire underwriters requirements.

The local police department had been working to bring about changes in this situation. It was not the worst situation to be found in the world, but it was not up to ordinary requirements. The fire department had also been co-operating in this work, and when the committee appointed by the safety campaign managers went at it in an aggressive manner, and

added their moral strength and persuasion, it was but a matter of time until the conditions were materially changed.

The significance of the entire investigation proved that bad conditions are merely a matter of ignorance of existing laws, due to carelessness on the part of those conducting business in which there is an extra fire hazard. Surely in these times every man should be interested in safe-guarding his own life and property, as well as that of others.

It has been said there is no such thing as an unavoidable accident. It is perhaps true, as all accidents are due to carelessness, or heedlessness in some one or both of the parties who contribute.

The same saying could be applied to fires. If John Smith would not leave oily waste to accumulate near other inflammable material, there might be no spontaneous combustion, and consequent spreading of the fire.

Had John done but one of these careless acts—let the waste accumulate, but removed from any chance of the fire spreading—he would have been but 50 per cent efficient as set down in the numerous fire preventive regulations. In that case John could have laughed at his joke on the fire department which answered the alarm only to find the waste pile burned out without further damage.

But John should aim to be a 100 per cent man. To become this, he should know all about safety devices, and the requirements of city and state. It is John's duty to know these things, and where John fails, he is that per cent less a good citizen.

In many garages it is still the custom to wash parts in gasoline, when they are taken from their greasy resting places in the car. Garage owners should know that this is expensive in two ways: First, there is a better way that costs less than one-third of gasoline way. This is first cost—say gasoline at 30 cents, and other agencies at eight cents per gallon.

The cheaper way is by far the cleaner and better way, and no first class automobile concern, or garage owner will be caught doing the thing the gasoline way.

Then gasoline for driving purposes is getting pretty scarce and becoming higher priced each day. A garage owner contributes to the conservation of gasoline, and aids to keep the price down if he uses the cheaper and better method.

Above all, the garage owner knows that if he can dispense with the necessity of washing parts in gasoline, he will reduce his fire hazard by a large percentage. And in reducing the hazard, he will reduce the insurance rate. That means real dollars that he retains, and can use to other and better advantage.

Study this problem carefully, Mr. Garageman, and see wherein you can aid in the saving of your own property, and possibly the lives of your employees.

# Install a Curtis Air Compressor



**The Curtis Sign**

Illustrated above—is 10x14 inches—baked enamel on steel. Cannot be bought, but is furnished FREE with every CURTIS Garage Air Compressor—and cannot be had in any other way.

Display a CURTIS "FREE AIR" SIGN above your door—it inspires confidence and will help build your business. Motorists are looking for this familiar CURTIS slogan—because they know oil rots tires—and that a CURTIS Air Compressor furnishes AIR FREE FROM OIL, which means fewer blowouts, greater tire mileage and less repairs. The CURTIS is the ONLY Garage Air Compressor with the controlled splash oiling system that eliminates all danger of forcing oil into the air line.

## CURTIS AIR FREE FROM OIL

Investigate the many exclusive features of CURTIS Garage Air Compressors. The line is complete—five sizes—stationary or portable. Just write your name and address on the margin of this advertisement—tear it out and send it to your jobber, or to us direct, for complete information and prices.

**Curtis Pneumatic Machinery Co.**

1515 Kienlen Ave., St. Louis, Mo.

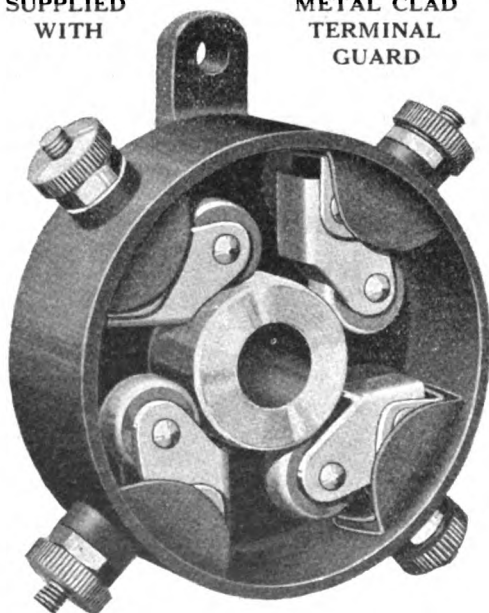
Branch Office—530-U Hudson Terminal, New York City



# Duntley Four Unit Timer

ALSO  
SUPPLIED  
WITH

DUNTLEY  
METAL CLAD  
TERMINAL  
GUARD



## THE LAST WORD IN TIMER EFFICIENCY and DURABILITY

It has been clearly shown that Fordson Tractors, and Ford Truck Motors, on account of their high speed require a Timer of extraordinary efficiency and durability.

To meet these requirements we have perfected the

### 1921 Model Duntley Four-Unit Timer

It is the last word in Time Efficiency with a Solidly Built Ignition Unit for each cylinder that insures Perfect Uniformity of Ignition, Maximum Power and Gasolene Economy in any Ford motor, whether in tractors, truck or pleasure car.

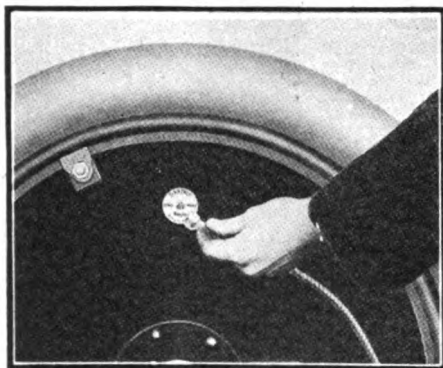
Sold by all live dealers and distributed thru regular channels.

**J. W. DUNTLEY, 1004 Michigan Ave., Chicago**

# Accessories For Automotive Trade

## The Dayton Discwood—A Distinct Innovation in Disk Wheels.

A new and improved disc wheel for automobiles and trucks has just been announced by the Dayton Automotive Wheel Co., of Dayton, Ohio. Instead of being made of metal as is the case with many other wheels of this type, the new "Dayton Discwood" is made from thin, rotary cut slices of wood, glued together under great pressure, the grain of each piece running in a different direction from that of the piece



An Unusual Disk Wheel.

next to it. This process of lamination is said to make the complete disk into a very strong, non-separable, non-warpable, but resilient whole, which at the same time is thoroughly waterproof.

The wheel has undergone thorough and severe tests both in the laboratory and on the road, extending over a long period of time. These tests, the manufacturers claim, show remarkable results, both as to strength and durability. Road shocks are said to be distributed evenly throughout the wheel.

Besides unusual strength, the wheel has the additional quality of lightness. Tire and fuel economy is one of the results of this quality.

A point which will be of interest is the ease and convenience with which the tire can be inflated. A practical patented angle valve attachment is applied to the wheel in such a way that the tire can be inflated from the outside face. The accompanying illustration clearly indicates this feature. Any standard demountable rim can be used on the Dayton Discwood.

Aside from the wood disk, the basic construction of the wheel is exactly the same as the ordinary spoked wheel, the same hub, rim, and other steel equipment that is usually used. That these wheels enhance the appearance of a car, are easily kept clean and do not gather nor carry mud, are additional features.

Of course, dealers will be interested in the Dayton Discwood. Additional information and trade prices can be obtained by

writing to the Dayton Automotive Wheel Co., Dayton, Ohio, mentioning the American Garage & Auto Dealer.

## Discriminating Dealers Will Be Interested in New Era Carriers.

Of more than passing interest are the tire carriers manufactured by the New Era Spring & Specialty Co., 156 Cottage Grove Ave., Grand Rapids, Mich.

New Era carriers are simple and practical in design and construction, and are manufactured in several styles and sizes. For all Ford and Chevrolet-490 tires, either alone or where the casing is on demountable rims, the company recommends the Sly interchangeable tire carrier. All contact and chafing is avoided, it is claimed. A place for the lamp and number plate is combined and provision is made for locking through holes in the adjusting turnbuckle. This carrier is quickly and rigidly attached to the frame by one U-bolt. A small L on the arm catches on the cross frame.

Write to the New Era Spring & Specialty Co. for catalogs and trade prices, and mention the American Garage & Auto Dealer when writing for further information.

## Farm Journal Supplies "National Advertising" Signs for Dealers.

It is night. The motorist's last good tube blew out a half-mile back and he is running on the rim. As he sees the lights of a strange town nearby he hopes with a sort of forlorn hope that his favorite tire may be found within its borders.

What a welcome, comfortable feeling it is to see in the window of a shop the sign, "Advertised goods sold here." Then he

trade papers. Dealers wanted to let the public know that they handled goods which were nationally advertised. To meet this apparent need for suitable signs, The Farm Journal made up a quantity of them for use by dealers.

Any dealer who is interested in having such a sign for his window or display



A Quick-Working Piston Inserter.

counter should write to The Farm Journal, Washington Square, Philadelphia, Pa. It will take care of requests for such signs. When writing don't forget to mention the American Garage & Auto Dealer.

## Advertised Goods Sold Here

**Especially goods advertised in**  
**The Farm Journal**

A National Advertising Sign for Dealers—The Letters in Large Type Are in Black; Those in Smaller Type, Red.

knows that his troubles are over, for there he can purchase reputable goods—goods that are widely known—anything from spark-plugs to those badly needed new shoes.

The Farm Journal in a cross-country automobile trip last year found many homemade signs on which the words "Advertised Goods Sold Here" appeared. This was presumably due to the influence of

## Another Cloud Product Which Will Meet With Approval.

Less than a second's time is consumed in replacing a piston of any size with any number of rings with the Cloud piston inserter, according to Kenneth Cloud, president of the Cloud Accessories Corp. of Chicago, the manufacturer.

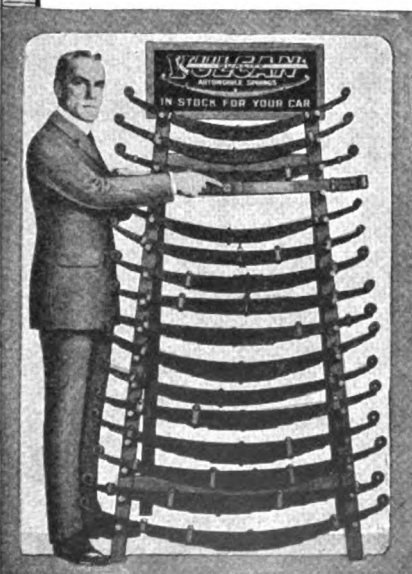
The piston inserter is adjusted to the piston and the nuts tightened to hold it.





## When Springs Break, put on **VULCAN** *The Replacement Spring*

*This attractive display rack is free with your first order for VULCAN Springs.*

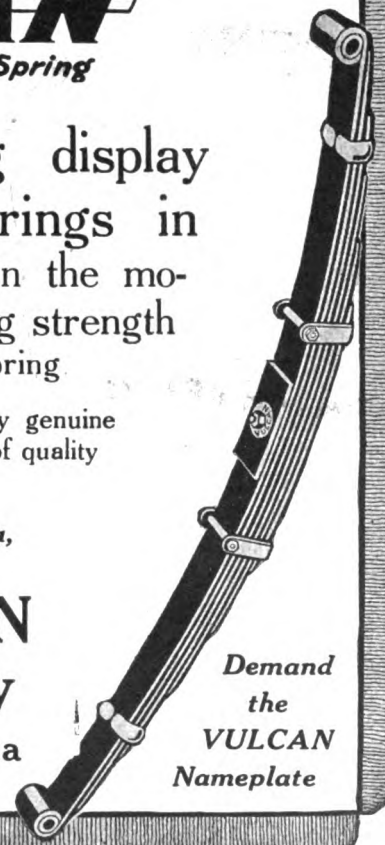


An eye-compelling display of VULCAN Springs in your window will bring in the motorist who wants enduring strength and quality in a replacement spring.

The VULCAN Nameplate (on every genuine VULCAN Spring) is the hall-mark of quality that clinches the sale.

*If your jobber cannot supply you, write us today.*

**Jenkins VULCAN  
Spring Company**  
Factory, Richmond, Indiana



*Demand  
the  
VULCAN  
Nameplate*

The piston is given a quarter of an inch lead into the cylinder and pressed down—and it goes smoothly and evenly into it. When it is used inside of the crankcase, the appliance can be opened at one side which permits it to slip over the connecting rod.

The Cloud piston inserter is made from No. 22 gage flexible cold-rolled steel, nickel-plated to prevent rusting.

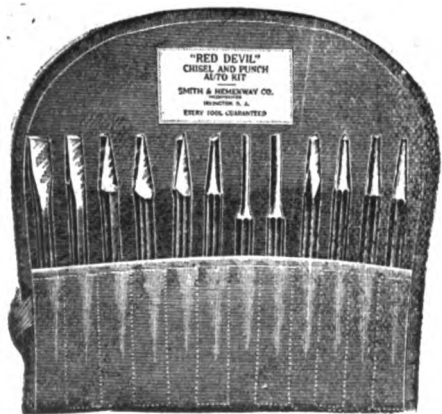
### Useful Machinists' Kits Presented by Smith & Hemenway Co.

The "Red Devil" pin punch set and chisel and punch set which the Smith & Hemenway Co. is presenting to the trade, are handy and useful kits for machinists. In almost any kind of repair work, the tools will be in constant demand—for example, removing valves and piston rings in cylinders, cotter pins in crankshafts, relining brakes, replacing and repairing fan belts.

Every tool is made of octagon stock, Swedish analysis point 80 carbon steel. The tools are put up in neat khaki cases that can be rolled up and put in the coat pocket if so desired.

"Red Devil" No. 169 is a chisel and punch set. In a neat kit are the following tools: Two cold chisels, two cape chisels, two machinist's pin punches, two solid punches, one half-round cape chisel, one round nose chisel, one diamond point chisel and one center punch. Each tool is five inches long.

"Red Devil" No. 483 is the pin punch set. Each tool is nine inches long. The set consists of six tools in a khaki case. The sizes of points are:  $\frac{1}{8}$  inch, 3-32 inch,



Useful and Compact Machinist's Kit.

3-16 inch, 7-32 inch,  $\frac{1}{4}$  inch and 9-32 inch.

More complete information and trade prices can be obtained by writing the Smith & Hemenway Co., Inc., Irvington, N. J.

### An Ingenious and Efficient Ford Transmission Lock.

The Ford transmission lock "Everloc" is as near theftproof as inventive genius can make it, says the J. C. Wood Co., its manufacturer.

About 15 minutes' time is required to in-

stall the device and once it is installed the car is safe. When the key of the Everloc is turned, both rear wheels are locked. The main plate and the latch which take the strain are made of malleable iron and it is impossible to break them. In no way is the transmission of the car injured, the manufacturer claims.

The W. C. Wood Co., 105-7 Western Ave., Minneapolis, Minn., will send trade prices and complete details concerning the Everloc, which is recommended by the Insurance Underwriters, to all those who are interested. When writing for further particulars, don't fail to mention the American Garage & Auto Dealer.

### Maryland Gives the Shaler Roadlighter Its Official Approval.

Maryland has been added to the list of states that have adopted the standard A. A. A. anti-glare headlight law.

In Maryland, as well as in all other states where official tests have been made, the Shaler Roadlighter, according to a report issued by the C. A. Shaler Co., its manufacturer, has ranked highest. A certificate bearing the seal of the state of Maryland gives this roadlighter official approval.

The Shaler Roadlighter is said to be the only lens that may be used with maximum candlepower bulbs and comply with every state law. The waste or glare rays of the Shaler Roadlighter are focused on the edges of the road, not scattered or fanned out.

The distance light is very intense, and the road is smoothly lighted to full width with spotlight intensity on the edges that protects the user against the glaring lights he meets. Fog and dust clouds are penetrated because the light is held down so that there is no back glare to interfere with a driver's vision.

Each pair of lenses is packed in a corrugated carton. There are 10 pairs in every case. All sizes are supplied. Dealers who want further particulars should write to the C. A. Shaler Co., 355 Fourth St., Waupun, Wis. Mention the American Garage & Auto Dealer when writing for further particulars.

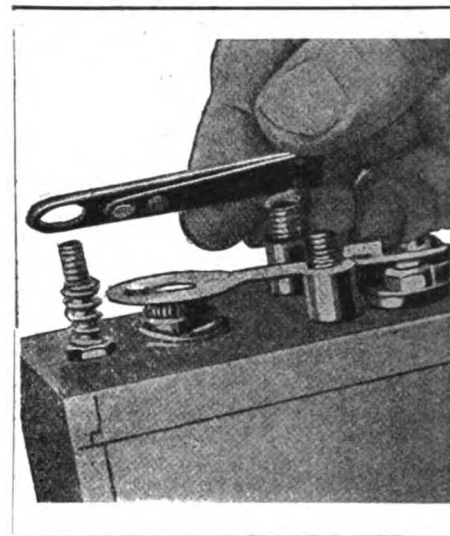
### K-W Sparkite Contact Points for Ford Coils.

K-W Sparkite is a new alloy metal developed in the laboratories of the K-W Ignition Co., Cleveland, Ohio, especially for Ford contact points. It is the result of years of work by K-W engineers who have made over 6,000,000 coils for Ford cars.

It has the following advantages, according to its manufacturers:

1. Long life. In Sparkite points the special metal is used for the entire point, no steel or cheaper metal being used for backing. The points are larger, consequently the heat is radiated well and the points have a long life.

2. Better and hotter sparks. Because of the larger points and the low surface resistance of Sparkite one-tenth that of tungsten—the current flows quickly and freely across these contacts, resulting in a hotter



The K-W Sparkite Points Are Practical.

and better spark at the plug, both when starting and at all speeds.

3. Smoother engine operation. Due to the bigger, hotter spark produced, a car with these points will operate on a thinner mixture, giving more mileage with less fuel and better general operation.

The illustration shows how these points are applied to the Ford coil.

### Paragraphs.

THE GREEN ENGINEERING Co., S. St. Clair St., Dayton, Ohio, which has a large and commodious new factory specializing on cylinder grinding and which makes Aluminum pistons and connecting rods, and power-plus cylinder heads for Ford cars, will be glad to forward descriptive information and quotations about its service.

THE APCO MFG. Co., Providence, R. I., has recently published a very attractive automotive catalog descriptive of its entire line of Apco specialties. It has requested the American Garage & Auto Dealer to say to its readers that it will welcome requests for this catalog from any garages, repair shops, service stations, and accessory dealers interested in obtaining more complete particulars concerning Apco products.

THE AM-PE-CO. SALES Co., Marshalltown, Iowa, will send copies of its direct reading cylinder gage to garage and service station men, if they will write requesting it, and mention the American Garage & Auto Dealer.

THE MILWAUKEE TANK WORKS' Catalog No. 9 featuring and illustrating the Milwaukee outfit for gasoline and oil expressly made for garages, repair shops, and service stations, will be gladly mailed on request. Write to the Milwaukee Tank Works, Milwaukee, Wis., and mention the American Garage & Auto Dealer.



# Every Sale Starts a Chain of Sales!

*That motorist*—to whom you sell a SHALER 5-Minute Vulcanizer—then and there becomes your steady customer—

Regularly thereafter—he is *bound to come back* to your store—to buy Patch-and-Heat Units for use with the SHALER Vulcanizer.

When you sell a SHALER 5-Minute Vulcanizer—that sale is only the *beginning of a Chain of Sales*—every sale of this chain brings liberal profit.

## **SHALER 5-Minute Vulcanizer** *Brings Customers Back for "Repeat Sales"*

Like compound interest on the money you have at the bank, your profits from selling SHALER 5-Minute Vulcanizers mount up. Every sale brings good profit—and—over and above that—it establishes a continuous, repeat-sale business that *automatically brings profits*.

### **Sell the SHALER and Make These Big Profits**

It brings customers to your store, who also buy other goods; it makes bigger customers of your old ones; it builds business; it makes sales and repeat-sales—and increases your profits. You make *one* sale of a SHALER Vulcanizer—and the SHALER *automatically makes dozens more*.

The SHALER is nationally advertised—nationally known—and motorists call for it by name. Simply display it where they can see it—and the SHALER will sell itself. Keep a sufficient stock—

*Order from your jobber today or write us at once*

**C. A. SHALER CO.**

**373 Fourth Street**

**Waupun, Wis.**

*Oldest and Largest Manufacturers of Vulcanizers in the World*

# Garage Equipment for Better Efficiency

## A New Needle Point Flame with a Super Kick.

Any needle point has a kick in it as may be ascertained by backing against one. But the one of which we speak is a point of flame and consequently would leave more lasting memories in its wake.

This needle point flame, the business end of the Washburn torch, manufactured by the Washburn Burner Corp., concentrates at this point about all the heat a simple combination of acetylene gas and air is capable of producing. The gas used is ordinary Prest-O-Lite from the commercial tank and the air from a garage air line or other compressed air device.

These easily available fuels are consumed in the ratio of 15 parts of air to one of gas. So perfect is combustion in this torch that this economy of fuel produces the intense, needle-pointed flame which, according to recent experiments conducted by Prof. H. C. Pepper, head of the School of Chemical Engineering, Purdue University, ranges in temperature from 1,620 to 5,300 degs. Fahr.

A close examination of the torch, which weighs but 4 ounces, shows the brass, needle-pointed flame distributor within the shell. This is a patented device of unusual design. It is constructed in such a manner that a perfectly controlled flame may be sustained indefinitely without popping out.

It does not matter, the manufacturer claims, whether the operator is doing small work or large, the flame of the Washburn torch is always under control. It can be thrown just where it is wanted. In other words, the flame is localized.

In lead burning it is very necessary to

have a well-regulated localized flame for otherwise there is great danger from splashing or the melting of neighboring parts.

The outfit is a convenient and portable



The Needle Point Flame with a Kick.

one. When the mixer is attached to the gas tank, it provides a strong handle enabling one to carry the tank with ease.

The Washburn Burner Corp., Kokomo, Ind., will send more detailed information and trade prices concerning this torch to any interested reader of the American Garage & Auto Dealer. And don't forget to mention the American Garage & Auto Dealer when writing for this information.

## The Schrader Improved Universal Five-in-One Valve Repair Tool.

The Schrader five-in-one valve repair tool, which has just been put on the market, has three repair and two utility operations which are given by the manufacturer as follows:

1. It repairs the inside thread on the valve. To retap the inside thread of the valve stem, the threaded end of the cross-bar is used. Sometimes it is necessary to

retap the threads before the valve inside can be removed. The tool will readily do this because it is so constructed that it will not injure the plunger pin of the valve inside during the operation.

2. It repairs the outside thread on the valve stem for the valve cap. The four-slotted die on the end of the tool is used.

3. It smoothes down the valve cap washer seat on the valve. The reamer end of the barrel opposite the four-slotted die is used in this operation.

4. It removes or inserts the valve inside. The slotted screw-driver on the end of the cross-bar, which is used in this operation, is substantially constructed at this point, and cannot be easily broken.

5. It deflates a tube by holding valve inside down by screwing the deflator into the mouth of the valve. The threaded projection on the side of the barrel of the tool is used.

The necessity of removing the valve inside or holding it open with the finger is



An Improved Valve Repair Tool.

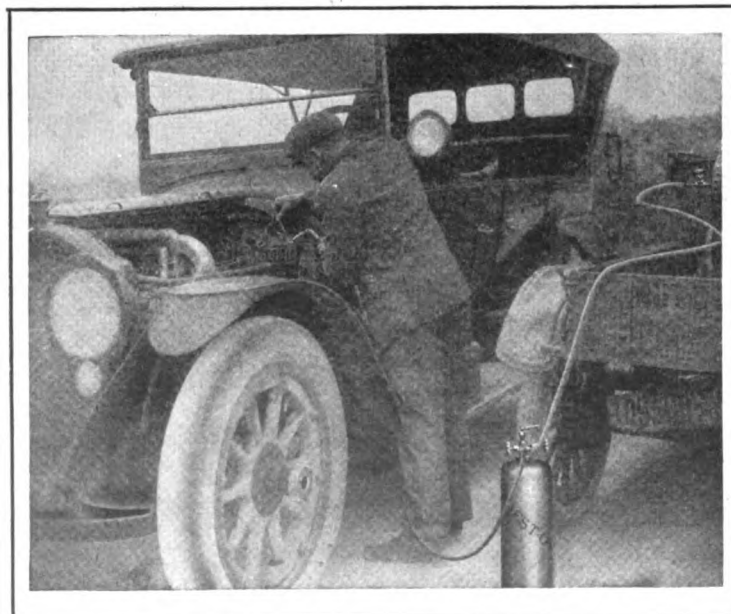
eliminated. Simply screw the tool into the valve stem and the air from the tube escapes alongside the projection.

For more complete details write to A. Schrader's Son, Inc., Brooklyn, N. Y. Trade prices and descriptive literature will be sent upon request. Mention the American Garage & Auto Dealer when writing for information.

## The Extreme Importance of Motor Main Bearing Replacement.

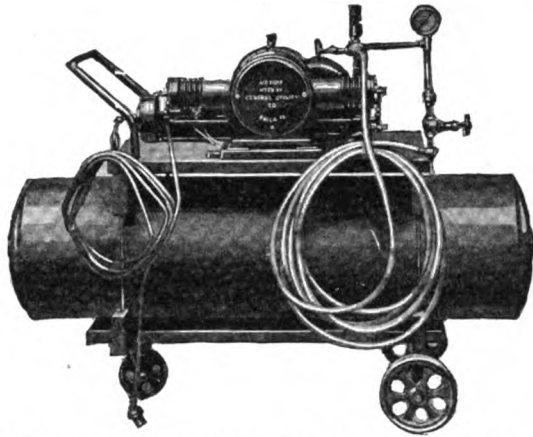
The condition and alignment of motor main bearings is often not given the attention that it deserves. There is a tendency to neglect this important work, due, no doubt, to the fact that many shops are not properly equipped to handle it, as it should be handled. And in some cases, it is due to the impression that the bearing caps receive all of the strain from the explosion and, therefore, all the wear.

While it is true that the caps wear most, the variation of the crankshaft in the bearings, due to the starting and stopping of the pistons in the end of their travel and also to the uneven throw of the flywheel and transmission, cause an uneven wear on



Showing the Needle Point Flame in Operation.





*Portable service model. Rigidly mounted, ball-bearing iron casters.*

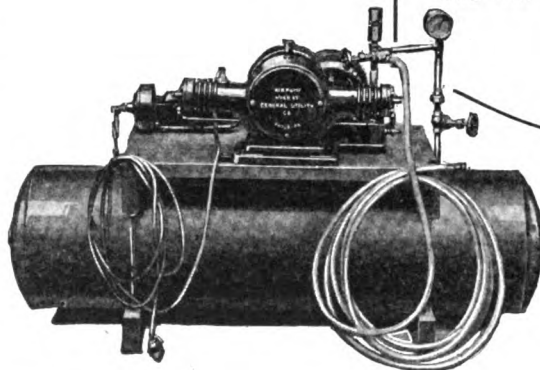
**T**HE garage that equips itself with a Service Model General Air Compressor has cut its air service problems down to a minimum. It has provided for itself a reliable source of air fully adequate to its needs.

We designed the Service Model to suit average garage and service station requirements and it has proved itself the most popular of our models.

It is furnished with an extra large  $\frac{1}{8}$ " welded tank, tested to 300 lbs., with a working pressure of 150 lbs. Its equipment includes an air gauge; safety valve; oil separator; 25 ft. best 5-ply rubber hose; 17 ft. of electric cable with socket switch; automatic stop and start switch; assembled complete ready for use.

Write for full information about the general line. We deal through exclusive distributors only. Some territory is still open.

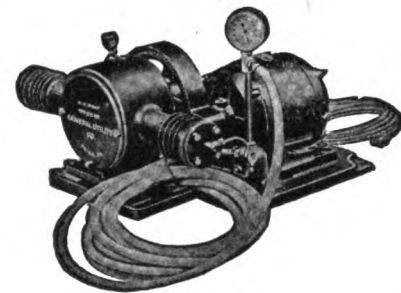
EXPORT DEPARTMENT  
17 BATTERY PLACE,  
NEW YORK, N. Y.



*Stationary Service Model, duplicate of Portable Service Model, but designed for stationary installation*

The General Two-Cylinder Air Compressor with its gear to gear connected  $\frac{1}{2}$ -horse, ball-bearing mounted G-E motor, is the standard compound unit on all General Utility outfits.

It is the product of eight years of experience and experiment and has proved in hundreds of garages and service stations that its single stage, horizontal opposed two-cylinder construction is the most efficient design that has ever been developed. It will pump over 5000 cu. in. of air per minute and do this at an unusually low cost for current.



The General Compressor shows the high quality of its design in its remarkably low cost of upkeep. With reasonable care it will give years of service without trouble or expense. It is rigidly mounted on a common bed plate with the motor. The motor is series wound and will start on load.

# GENERAL UTILITY COMPANY

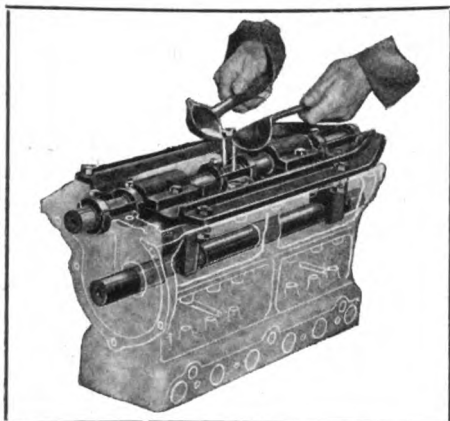
## 1324 Ogden St. Philadelphia Pa.

### *Utilities that Sell Because They Serve*

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

these bearings and pounds them out of round. Furthermore, the three bearings are not of the same size and are not subjected to the same stresses.

Experience shows that the center bearing suffers most and when the bearings run



Pouring Operation Performed by Storm Tool.

hot, the heated metal from the caps is forced out and often carried over to the opposite or upper side, building this up and throwing the bearings out of true alignment.

To tighten the bearings when they are in this condition will cause the crankshaft to spring at each revolution, resulting in crystallizing and breaking or at least in a permanent bend. Bearings so tightened also cause uneven friction and wear and do not stand up.

Scraping-in is hardly practical for these bearings, says the Storm Mfg. Co. First, because it is too slow, and second, because of the fact that when these bearings need attention, they should be built up rather than scraped down.

No matter what pains are taken with other work, if this important part is not taken care of, the motor will not run satisfactorily and the work will be only short lived.

The Storm main bearing replacement tool is a simple and practical tool for this class of work. It consists of a main jig, made heavy and substantial, which is used for holding both the Babbitting and boring

bars. It obtains its alignment from the camshaft bearing holes by means of ground camshaft aligning arbor. The Babbitting arbor is made smaller than the crankshaft and is provided with specially constructed pouring troughs, giving ample space for the free flow and proper filling of the metal.

The boring bar is of ground chrome steel provided with three double-face and double-end cutters, which bore all three bearings at one operation. By the use of this tool, new main bearings can be produced in from 20 to 30 minutes, exactly the same as the original bearings, perfectly aligned and in the exact original position, says the manufacturer.

The tool is made in two sizes—one for the Ford and one for the Fordson, and comes complete with full instructions, packed in permanent cases.

Additional information and trade prices may be obtained by writing to the Storm Mfg. Co., Minneapolis, Minn. Mention the American Garage & Auto Dealer when writing for further particulars.

### Unique Tests Prove Master Hydrometer Absolutely Accurate.

To demonstrate the absolute accuracy of the new improved master hydrometer, the Beckley-Ralston Co. is illustrating an inverted "U" test tube showing actual tests of hydrometer floats under identical conditions. This miniature testing advice is a duplication of the larger testing apparatus exhibited at the automobile show in Chicago.

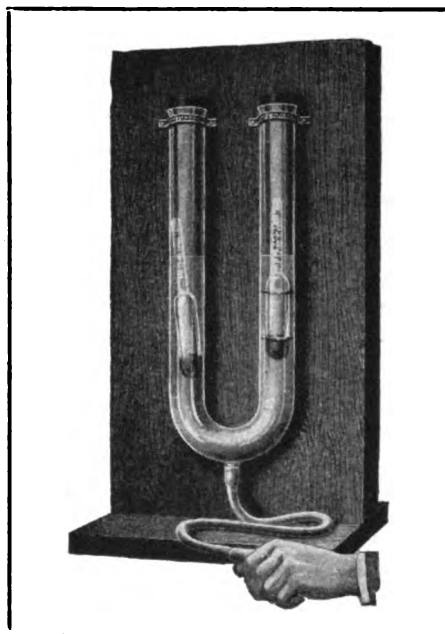
The illustration shows the apparatus. In the right hand side of the U tube is a Master hydrometer float. In the left hand side of tube, is an ordinary battery hydrometer float. The solution in the tube is ordinary battery solution which allows a fair and equal test of both floats under actual working conditions. The rubber bulb attachment, when squeezed, raises the level of the solution. When all motion of the fluid has ceased, the floats register the strength of the solution.

The illustration reproduced from a photograph taken at this time, shows the Master float riding free and upright while the

ordinary float has tipped against the side of the tube where the capillary attraction causes it to stick and ride lower in the solution than it should. The absolute accuracy of the Master hydrometer principles, secured by the celluloid ring with projecting finger guide float, is quite apparent.

By eliminating all possibilities of the Master float sticking to the test tube, the Beckley-Ralston Co. believes that the one great objectionable feature in hydrometer syringes has been removed. Other good features are extra large rubber rings protecting against breakage and a larger and heavier glass barrel.

The hydrometer has received the highest endorsement from the largest battery concerns in the country as being the nearest to perfection of any on the market. It is



Tests of Hydrometer Floats.

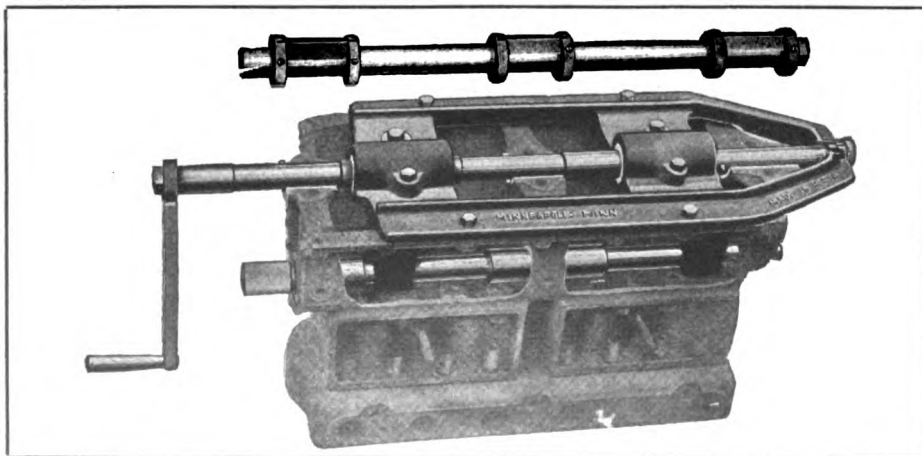
estimated that there is a waiting market for 3,000,000 of these new instruments and dealers are being advised to be the first in their territory to supply the Master. The Master hydrometer will be advertised nationally and dealers will be supplied with free electrotypes and other selling aids.

The trade is displaying an awakening interest in the Radiometer, the brand new radiator anti-freeze solution tester being made by the same firm, and there is every indication that it will be warmly received by motorists everywhere.

A card addressed to the Beckley-Ralston Co., Dept. Y, 181 South Michigan Ave., Chicago, mentioning the American Garage & Auto Dealer, will bring complete information relative to the Master hydrometer and the Radiometer.

### Paragraph.

BECKER BROTHERS, 23-25 N. Jefferson St., Chicago, who recently introduced a universal test bench, advise that it is proving to be very popular with garages, repair shops, and service stations.



Main Bearing Tool with Boring Bar in Place.



# "Makes Your Tire wear Longer" —that's the message all auto drivers like to hear

YOU can build your business bigger by showing your customers how they can get better service and greater mileage out of their tires. The cost of auto driving is slowly but surely increasing. As a result, thousands of owners must either drive less, or must purchase equipment that will produce greater mileage at a given cost. Your **direct profit** lies in selling such equipment. And the good will you thus establish will bring you an **indirect profit** in hundreds of ways.

## The Coffield Tire Protector

is one sure means of reducing tire expense. It yields you a splendid profit on every sale. It won't interfere with the volume of your business, because more driving will be done. Your customers are interested in anything that will enable them to drive more without costing more.

Coffield Protectors are made of pure, live rub-

ber, **without fabric**. There is absolutely no chafing or heating of the tube or casing; punctures and blowouts are practically eliminated; and the mileage of the tire is more than doubled.

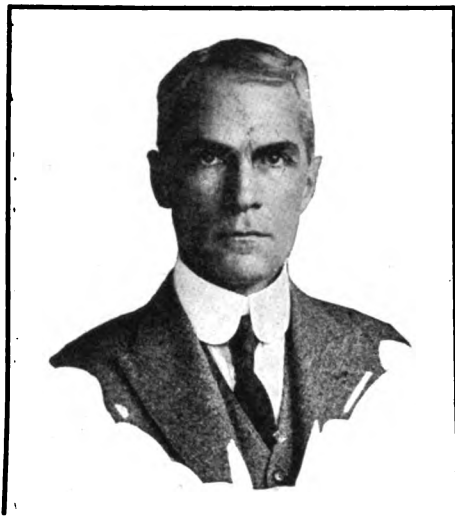
You are rendering a real service to your customers and building up business for yourself when you recommend and sell Coffields.

*Write us for our money-making proposition for dealers.*

**THE COFFIELD TIRE PROTECTOR CO., Dayton, Ohio**

# Ten Years of Making Vulcan Springs

July 15, 1920, marked the tenth anniversary of a pioneer in the spring replacement field—the Jenkins Vulcan Spring Co., of Richmond, Ind. Although it is now ten years since the company assumed



President Jenkins Started His Successful Career as a Bicycle Dealer.

its present corporate form, Vulcan springs had their beginning 16 years ago in Sumter, S. C., where they were fitted to the famous Cadillac single-cylinder model.

The Jenkins Vulcan Spring Co. today is operating a large plant which is devoted exclusively to the manufacture of high grade springs for replacement purposes. This is said to be the only plant in the world devoting its production exclusively to spring replacement, with an organization specializing on that class of work, studying carefully the needs of the business as to quality and types of springs, and maintaining a distribution which places the needed spring within reach of any motorist without unnecessary delay.

T. B. Jenkins, president of the company, and the original founder of the business, commenced his business career as a bicycle dealer, having a very small shop in Sumter, S. C., immediately after his discharge from the army at the close of the Spanish - American war. The business was very small in the beginning, but at once began to realize substantial growth.

It was in 1903 that Mr. Jenkins embarked in the automobile business as a

side line to his bicycle business. In a few years the bicycle business was closed out, and his entire effort and capital directed toward the building up of an automobile agency.

The very first springs for replacement purposes were sold in 1904 for the Cadillac one-cylinder car, for which car Mr. Jenkins had the agency in a number of counties. These springs were made under contract by a spring maker in the North. The roads in the South were very bad and there was much spring breakage, requiring a stock on hand at all times for the models in current use.

From the very beginning the possibilities of this particular department of the automotive business were recognized, and the stock of springs was enlarged as rapidly as possible, to insure the widest service that could be given. In 1907 the trade name "Vulcan" was chosen as being representative and easily remembered. As early as 1908 there were several thousand springs carried in the Sumter, S. C., stock, and shipments were made freely into seven or eight states from that establishment.

Following insistently his idea of developing this business to its fullest extent, Mr. Jenkins entirely closed out his automobile sales business, and just ten years ago, on the 15th of July, 1910, it was decided to enlarge the scope of the business and to deal exclusively in spring replacements on a national scale, with headquarters and factory in St. Louis. From that date the business was known as the Jenkins Mfg. Co., and realized substantial growth, keeping pace with the growth of the industry as a whole.

In October, 1917, the company was re-organized with a capital stock of \$500,000, the new corporate name being the Jenkins

Vulcan Spring Co. Factory and headquarters were located in Richmond, Ind., the present center of activity for the company, which now operates seven of its own branches in the principal strategic centers of distribution. Several hundred of the most influential jobbers in the United States are carrying full stocks of Vulcan springs, and thousands of dealers are prepared to supply quickly an exact duplicate of almost any broken spring.

The company advertises extensively in about 20 of the principal trade papers, and



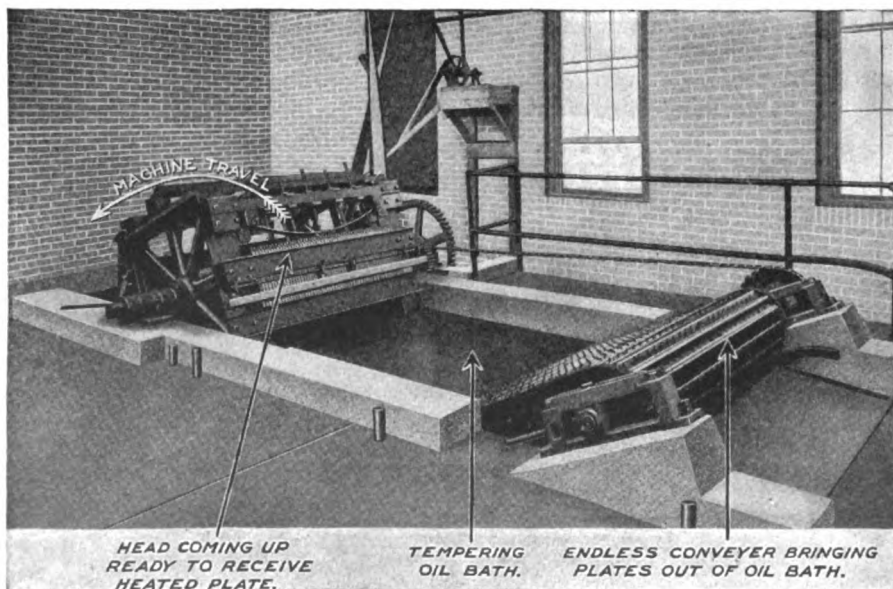
Vice-President Hiatt is a Business Man of Vision and Ability.

in leading periodicals of national circulation, such as the Saturday Evening Post, Literary Digest, etc.

The production today is approximately 600,000 springs per annum, and will be much larger when more raw material can be obtained.

The stock of springs that must be carried on hand for a proper maintenance of the service is over 4,000,000 pounds in the stockrooms of the company in Richmond.

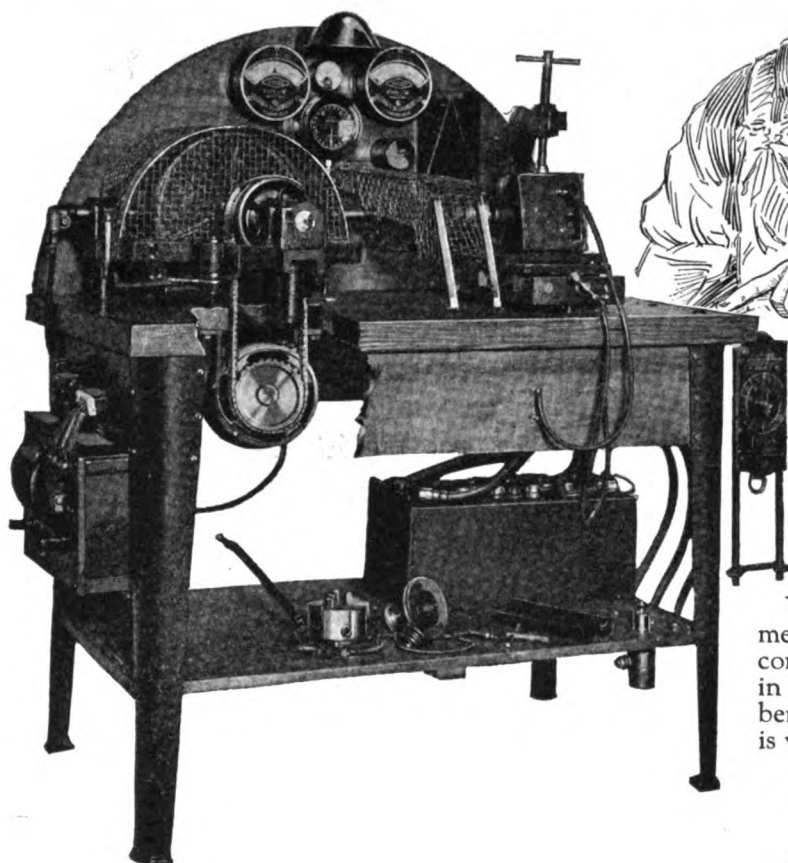
Edgar F. Hiatt, vice-president and general manager, formed his connection with the business about one year ago. Mr. Hiatt has been president of one of the leading banks in Richmond for a num-



Jenkins Spring-Making Machines Have Great Capacity for Efficient Production.



# Bigger Profits for YOU—NOW



**Y**OUR ability to test any generator starting motor or magneto thoroughly and in a very small amount of time, which you can do with the Becker Bros. Universal Test Bench, is the kind of service your customers are looking for.

You know from experience that such an equipment will enable you to make your service complete—such a service pays big profits, not only in cash business, but in satisfied customers. This bench is very easy to operate—its cost of operation is very small.

## Sold On Cash or Monthly Payment Plan

Whether you desire to purchase the Becker Brothers Universal Test Bench on the cash or installment plan, do not hesitate—every day you do without an equipment of this kind, you are losing a great deal of profit you might as well have. Write us today for complete description and prices—no obligation.

### BECKER BROTHERS

23-25 N. Jefferson Street . Chicago, Ill.

**B.B.B.**

*Stands For Quality*

Becker Brothers' Brushes stand for quality. You may rest assured that the bench will prove just as satisfactory.

## You Can Buy This Bench Complete or the Parts Separately

We have prepared a folder which gives photographs of all the highly important parts as well as a complete description—it even shows you how to operate the bench.

After reading the description of the Becker Brothers Universal Test Bench and parts in this folder, you will be better able to decide whether you need a complete bench or the parts themselves. The folder will be sent you free on request.

# Becker Brothers UNIVERSAL TEST BENCH

ber of years, and is a business man of recognized vision and ability. Mr. Hiatt forsook a banking career of acknowledged prominence and high promise to come actively into this manufacturing and distributing field, which offered even greater possibility of substantial development.

Recently the company has connected with it, in the capacity of production manager, A. L. Ellis, who is probably one of the most experienced production executives in the leaf spring industry in this country.



**A. L. Ellis, Production Manager, Has Had Years of Experience in Manufacturing.**

Mr. Ellis has been for more than 20 years actively engaged in leaf spring production, and before going to the Jenkins Vulcan Spring Co., as manager of production, was for 12 years superintendent of the spring division of the Detroit Steel Products Co.

In charge of the sales department, as director of sales, is D. T. Hersey, a sales executive of wide experience in the automotive accessory field. Mr. Hersey was for a number of years actively connected with the Splittdorf Electrical Co. in the capacity of assistant general manager of sales. There are few executives in the automotive industry with a wider acquaintance among the principals engaged in accessory distribution than Mr. Hersey.

The replacement spring business has reached very large proportions and today is one of the principal factors in the automotive industry. It is estimated that there are several million springs broken annually in the United States, the breakage being directly traceable to three causes: First, poor workmanship in the springs themselves; second, irregular surfacing on the roads; third, overloading.

There are other causes, such as excessive speeding and improper design of the springs themselves with reference to the work they are called upon to perform, and neglect of the spring, as, for instance, in-

attention to lubrication and the tightening of clip bolt nuts, etc.

A trip through the Jenkins Vulcan factory is a most interesting and informative experience. The equipment is modern in every respect, and some of the special machinery used is of the company's own exclusively patented designs, with marvelous capacities for both production and quality. The entire production is being constantly Brinnell-tested, and the testing laboratory is complete in every detail.

The manufacture of springs in itself is a most interesting study. The layman is accustomed to taking for granted a number of things, with reference to the making of the spring, which as a matter of fact, requires the closest possible scrutiny and care. It is with truth, stated that a man can lift in one hand, \$1,000,000 worth of watch hair-springs. That value represents little more than the skill and care exercised in manufacture. Inasmuch as one man can lift such a large value, it is sufficient argument that the raw material itself is insignificant except as to the correct formula of the analytical content.

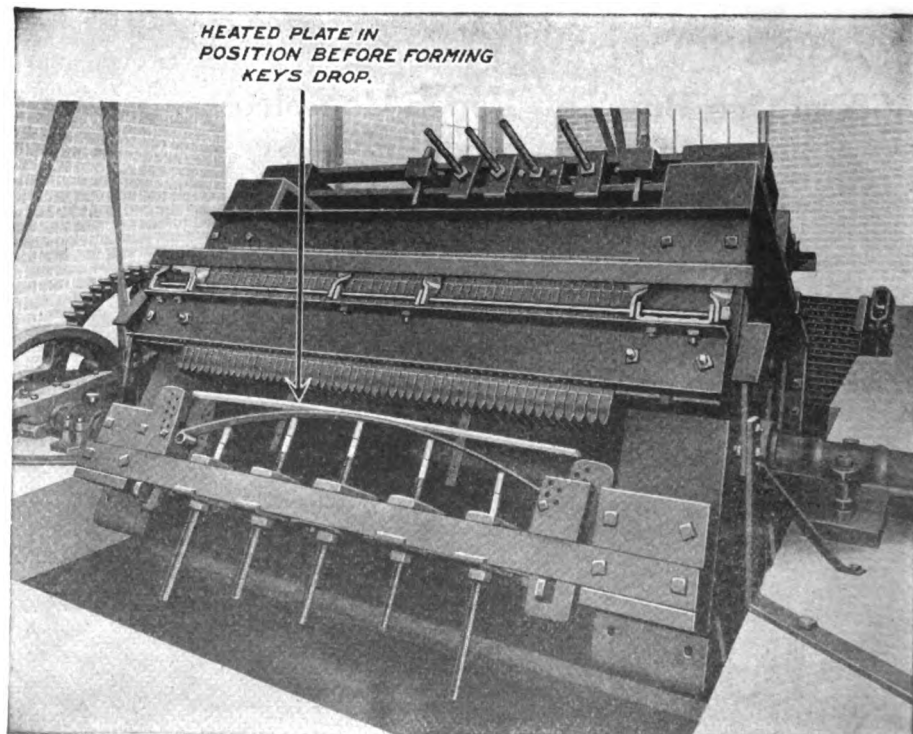
In like degree it is important that the utmost care be taken in the making of a thoroughly good automobile leaf spring. This is the guiding principle of the Jenkins Vulcan Spring Co.—to build them with the utmost care. The results of this policy have shown themselves clearly in the performance of Vulcan springs. Vulcan methods of manufacture have put strength and endurance into a part of the car on which no little comfort, service, and even safety, depend. The realization of fact by the motoring public is demonstrated in the steady growth in sales of the Jenkins Vulcan Spring Co.'s product.

Added to this quality is the widespread service afforded by Vulcan distribution. A spring for any make or model of car, it is said, is available without delay throughout the greater part of the United States and Canada. More dealers are con-

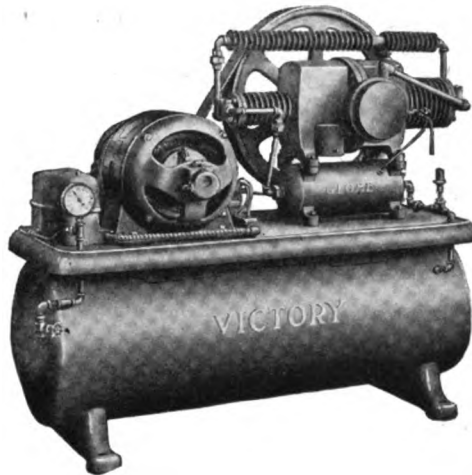


**Sales Director Hersey is an Executive of Very Wide Experience.**

stantly being enlisted in the Vulcan ranks, and the company officials will not rest satisfied until they have met in the fullest measure the requirements of their slogan, "In Every Town, for Every Car."



**Some of the Company's Machines Are Exclusively Patented Designs.**



**"VICTORY" Complete Automatic  
Motor Drive Unit**

# **GLOBE AIR SERVICE**

## **your best advertisement**

A first class air service is the most effective and profitable form of advertising that you can use. Any motorist prefers to stop at a garage where his tires are inflated promptly and properly. Your air service is your first point of contact with a large number of car owners. If the service is prompt and dependable, a favorable impression is made—resulting in profitable business.

When you install a GLOBE outfit you are certain of giving an air service which cannot be excelled—and which will prove a big factor in building your business.

The Globe manufacturers made the first two-stage air compressors, setting a standard that has never been equalled.

Globe Air Compressors meet all the requirements of garage service. They provide ample pressure and capacity for inflating the largest pneumatic truck tires. As these tires are daily becoming more numerous, you realize the need of being able to give them service. Globe Air Compressors are noted for their low operating cost and great durability, as well as the dependable service they always render.

*Write Department A-G for Bulletin.*

## **GLOBE MFG. COMPANY**

**Battle Creek, Mich., U. S. A.**

# **GLOBE**

## ***Air Compressors***

# News of Manufacturers and Jobbers

## Educational Meetings in the Interests of Good Citizenship.

Educating boys and girls to be good citizens is one of the unusual features of the welfare work of The National Cash Register Co. of Dayton, Ohio. Every Saturday morning about 1,200 children are guests of the company at a two-hour entertainment. These entertainments are held at the factory auditorium and at the N. C. R. City Club, in the heart of the city.

The meetings are open to every youngster in the community. Their purpose is to teach the children good health, good habits, and good citizenship. Boys and girls come from all parts of Dayton. Their ages range from four to 14 years.

The programs are always very interesting, but never fail to educate as well as entertain. The right kind of knowledge is attractively presented by the use of illustrated lectures and motion pictures. Capable speakers give short, helpful talks. The children are impressed with the fact that they should grow up to be useful citizens. They are shown that the big thing in life is to do all the good possible, to all people.

Saturday morning entertainments were started about three years ago and are an advanced step in the educational work carried on among the boys and girls. They enable the company to do more good for the children than ever before. The programs usually consist of educational and comic motion pictures, illustrated lectures, musical numbers and refreshments. Everything is free and all youngsters in Dayton are invited to attend the gatherings.

This educational work has helped the children, the community and the company. The boys and girls have exerted a strong influence in bettering conditions in Dayton. The result has been happier homes, better working and living conditions, and good government.

## Production Under Way in Gigantic Plant of O. K. Battery Corp.

More than 2,000 skilled and unskilled men will be employed in the plant of the O. K. Giant Battery Corp. at Gary, Ind., by the time the eighth unit of the gigantic plant is completed in the fall. Two buildings are now in use and the third will be finished and production at top speed this month, according to Paul B. Rabe, president of the corporation.

Contracts call for completion of 12 buildings by Dec. 30 of the year. The corporation has a tract of 40 acres, and the entire plant will be comprised of 40 buildings. The O. K. Giant Battery Corp. manufactures a dry rechargeable battery for all purposes.

## The M. W. Dunton Co. Holds "Good-Will" Banquet.

The M. W. Dunton Co., of Providence, R. I., manufacturer of Nokorode soldering flux, gave a banquet to its employes on the evening of June 15, 1920, in the ballroom of the Crown Hotel in that city.

An entertainment was furnished by a musical trio and interpretative dances given by a charming young toe dancer.

After dinner, the party took the form of a "get-together" meeting which was

presided over by Ernest V. Halligan, sales manager. The president of the company, Frank Chapman, gave an interesting talk covering his career as the successful manufacturer of Nokorode, showing its growth from infancy up to the present time. Mr. Chapman also announced that he had just purchased a much larger factory, to which they would move in the early fall.

Lawrence Chapman, to whom the Solderkit Club of America owes its origin, spoke on co-operation, illustrating his talk with specific cases of co-operation and lack of co-operation and showed the results of each. Remarks were made by the employes present, who voted the affair to be a tremendous success. The meeting was closed by each pledging himself to renewed effort for the further success of Nokorode.

## Automatic Steam Carbureter in Fifth Year of Production.

The Automatic Steam Carbureter Co. of Chicago has just entered its fifth year of manufacturing and distributing the Automatic steam carbureter with a record which is asserted by officials of the company to have surpassed all expectations. The company manufactured and sold 36,316 carbureters during the past year and has expanded its facilities to meet a demand for at least 50,000 carbureters in 1920.

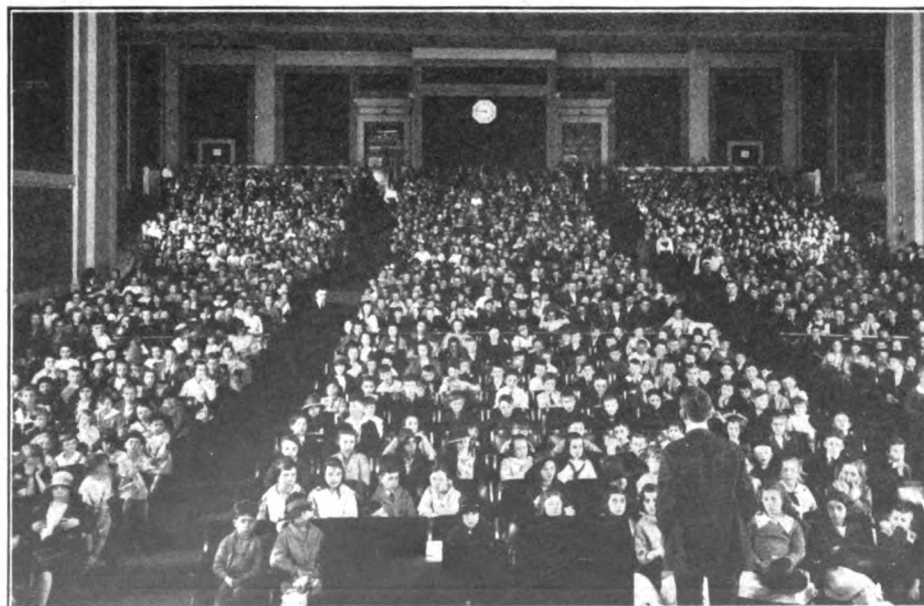
A new design of the Automatic embodies several improvements, but no fundamental change. All parts are now fitted to 0.0002 inch and all threads are cut much finer. A bigger check valve has been made and in general the carbureter has been perfected.

This carbureter gives the engine a fixed and controlled flow of live steam. The steam is made within the carbureter and injected into the gasoline intake manifold immediately above the butterfly valve of the gasoline carbureter. The successful injection of steam has long been known to automotive engineers to have offered the greatest opportunity for the final perfecting of the gas engine operation. The steam is said to add a wonderful resiliency to the motor's performance, eliminate carbon, increase power and save on gasoline.

To those who write to the Automatic Steam Carbureter Co., 2498 Milwaukee Ave., Chicago, trade prices and descriptive literature will be sent. Mention the American Garage & Auto Dealer.

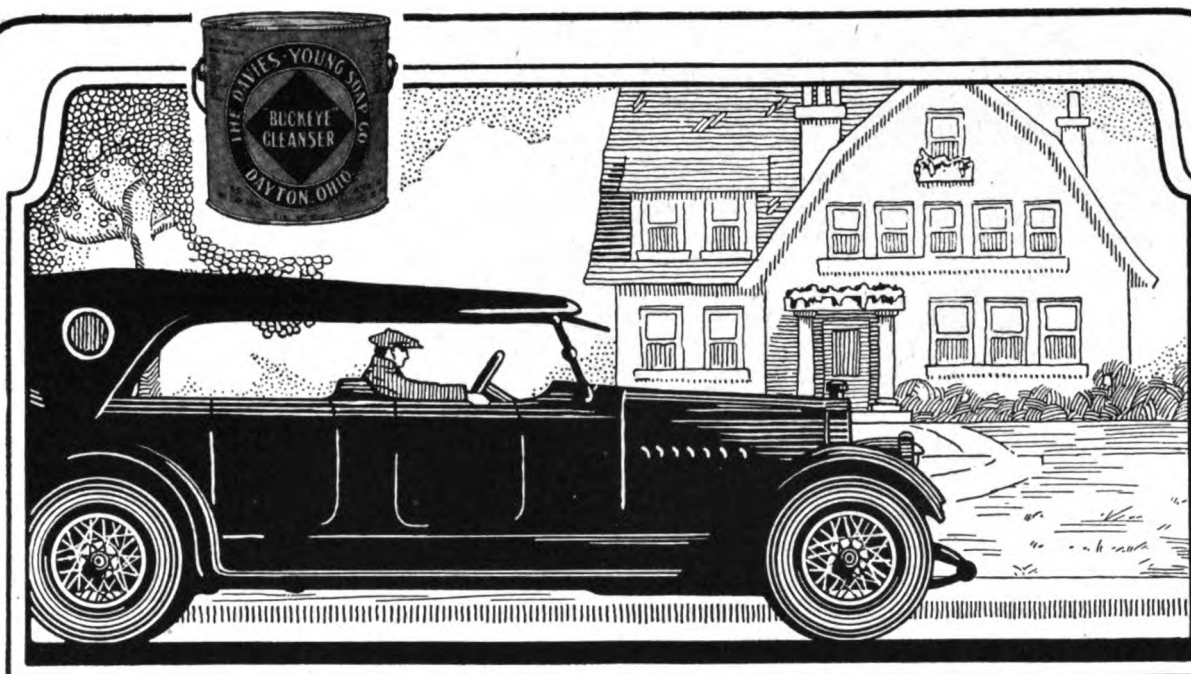
## "Sentinel" Road Markers Offer Advertising Opportunity.

For some time there has existed a national need for a highway marking system so organized and standardized that the motorist might not only be carried from



1,200 Children Listening to Educational Entertainment Given by N. C. R. Company.





## Pride in the appearance of the auto is a social and business asset

**A** DIRTY, dusty, dingy motor car is apt to reflect a careless and slipshod driver. No man of ambition and standing in his community wants to create such an impression.

It is comparatively easy to keep the car looking like new for a long time. But first the driver must realize that dust, grime and grease are fatal to the costly finish which it had when it was first driven out of the salesroom.

To clean—to polish—to restore the lustre—to lengthen the life of the finish—these things are the mission of

### **BUCKEYE CLEANSER** *the auto soap that cleans and polishes*

The owner can't afford to risk an ordinary soap. One application of such a soap may ruin the finish for all time—leaving the surface pale, dull and smoky.

Buckeye Cleanser stands without an equal for use on the most highly polished surface without the slightest injury to the finish.

It has been tested and proven, and is recommended by automobile manufacturers, garage owners, and car drivers everywhere.

It will enable the owner to keep up the appearance of his car, which is so important nowadays.

*Accessory dealers, garage owners, and hardware merchants find that Buckeye Cleanser is its own endorsement. It is a ready repeater. Usually the first sale leads to many more. Carried in stock in several size containers by most jobbers.*

**The Davies-Young Soap Co.**  
Dayton, Ohio

**Coast Sales Agents:**  
Allied Industries, Inc.  
San Francisco  
Los Angeles Seattle

**Denver Sales Agents:**  
Paramount Lubricants Co.  
Denver, Colorado

**Southern Sales Agents:**  
The Colley-Minnich Co.  
Atlanta, Georgia

# BUCKEYE CLEANSER

THE AUTO SOAP THAT  
CLEANS & POLISHES



city to city and highway to highway, but from state to state and ocean to ocean with systematic definiteness.

About a year ago a number of good roads boosters met in Fort Dodge, Iowa, and organized the National Highway Marker Association. The work of the organization will consist in logging and marking roads throughout the country.

The road markers which are being used are uniform in size and color and are so designed that they carry the legend of the trail and give positive touring information. They are made of steel and stand seven feet above the ground, supporting a steel disk 30 inches in diameter upon which appears the road marking—designating right turn, left turn, railroad crossing and any unusual conditions upon the highway. These markers appear at sufficient distance before the contingency in the road so that the motorist is cautioned adequately.

Besides the road deviation markings, there is left upon these disks sufficient space for advertising. The space is rented to local and national advertisers, and the revenue derived therefrom permits the organization to construct, install and maintain this national marking system and keep the equipment smart and sparkling. White lettering upon a brilliant dark red back ground assures a harmony which is in keeping with the type of service such a marking system must render.

As a national advertising medium, the markers are enthusiastically received. Advertising appears on both sides of the disks. Each message comes within direct range of the motorist's vision. He must look to the marker, and consequently the advertisement for road guidance. The cost is said to be remarkably low, varying according to the advertising service required.

### Predicts Motor Vehicle Competitor of Railways.

It is predicted by Roland R. Conklin, president of the Chicago Motor Bus Co., that just as the electric interurban is a competitor in certain circumstances to steam railroads, so will the motor vehicle take a certain amount of business from the railways.

The reasons why this competition could be carried on successfully, according to Mr. Conklin, are practically the same reasons which give the motor bus the advantage over the electric car, and in addition there would be greater mobility in the gathering of freight and material, and the avoidance of terminal congestion at both ends of the line.

Some of the advantages given as to the superiority of the motor bus over the electric carrier are:

1. Greater mobility.
2. Absence of tracks.
3. Continual expansion to meet newly-developed needs.

4. Ease with which routing can be shifted without loss of equipment.

5. Mechanical difficulties do not obstruct all following vehicles and interrupt schedule.

6. Possibility of maintaining better schedules and intensive service.

7. Weight of vehicle per passenger less than that of common electric carriers.

8. More efficient for certain kinds of traffic.

9. Makes available for pleasure and business residential thoroughfares closed to the common electric carriers.

10. Act as feeders to more rapid and long line electric carrier.

### New Catalog of Tire Repair Equipment for Tire Repairman.

The Williams Foundry & Machine Co. recently released to the trade its 1920 catalog showing a most complete line of equipment for the tire repairman. According to the makers of Akron-Williams vulcanizing equipments, the tire repairing business has reached the point where it will attain a greater development in direct proportion to the energy exercised in building better repairs. Tire repairing has gained an important place in the automobile accessory industry because it is directly concerned in tire economy and service.

It is evident the faith of the Williams Foundry & Machine Co. in the future of the tire repairing business has had a bearing on that company's work in designing its new equipment. Not only the thought and effort of skilled engineers has been brought into play, but the boiler regulations and restrictions of the different states has been considered in the preparation of the new line and adequate provisions made for building its equipments to meet all requirements.

One of the outstanding developments in this new line is the construction of a special 1½ horse power boiler or generator to be used in connection with the company's Model 33-R outfit. This boiler is of vertical tubular type and of steel construction throughout. It is readily convertible from gas or gasoline burning to coal or coke burning with the addition of a small section which fits to the bottom of the boiler unit. This boiler has a very low water line, permitting a gravity return from the vulcanizing units without necessitating the placing of the boiler in the basement or on the next lower floor.

An inverted tube vulcanizer, unique in its adaptation of a principle giving greater efficiency and ease of manipulation, has been added in the 1920 line. The tube hangs down away from the heat during the cure. The pressure bars are controlled by foot-pedals enabling the repairman to have both hands free to adjust tube on the hot plate. A feature of construction, when this outfit is built to use gasoline as fuel,

permits it to be pushed about the garage or repair shop floor at the convenience of the operator.

Copies of the new catalog may be obtained by writing the Williams Foundry & Machine Co., Akron, Ohio, and mentioning the American Garage & Auto Dealer.

### McCord Manufacturing Co. Distributes Attractive Poster.

An attractive poster, showing the various copper-asbestos cylinder head gaskets used on all American passenger cars, motor trucks and tractors, is being distributed to service stations, garages, motor accessory dealers and jobbers by the McCord Mfg. Co. Eighty-nine different gaskets are shown on the poster in the natural copper color. Those gaskets are used on 140 passenger cars of different models, 47 motor trucks, 31 tractors and three miscellaneous motors.

An alphabetical list of the cars, trucks and tractors shows the numbers of the McCord gaskets built according to the manufacturer's blue prints for these particular motors.

Posters will be forwarded to any service station or dealer who has not received this complete directory of cylinder head gasket information. Write to the McCord Mfg. Co., Detroit, Mich., and don't forget to mention the American Garage & Auto Dealer.

### New Compressor Unit.

Globe Mfg. Co., Dept. A-G, Battle Creek, Mich., will gladly supply complete information about its new Victory automatic motor-driven compressor unit upon request of readers of the American Garage & Auto Dealer. This unit is substantially mounted on a steel air storage tank, is beautifully finished, and makes a compact, attractive, and practical automatic air plant.

Features of interest which the unit embodies are an improved belt drive consisting of a pliable, endless, flat belt operating in conjunction with a belt idler of special design; a new type automatic controller or switch; an improved automatic pressure unloader which permits the motor and compressor to come up to full speed without pressure load when starting and also insures oil free dry air keeping oil and moisture trap automatically drained.

### Obituary.

In the death of their only son, Lawrence, Mr. and Mrs. Frank Chapman, of Providence, R. I., have the sympathy of their many friends. Mr. Chapman, who is president and treasurer of the M. W. Dunton Co., was out sailing with his son on July 5 when the boat overturned. Lawrence was overcome with fatigue after being in the water several hours and passed away. His father supported the body until help arrived.



**T**HE Harvey patented process of heat treating and tempering does the work so accurately and uniformly that the utmost strength, endurance and resiliency are given the spring.

Rigid factory tests and inspection make sure that the Harvey Spring will stand up under strains that break the ordinary spring.

The Harvey has no weak spots. It offers free action that imparts maximum riding ease to the motor car and lessens wear on tires and mechanism. Yet the Harvey Spring never sags.

The three cardinal sins of the common automobile spring are breakage, sagging and rigidity—the three complaints the dealer hears so frequently. But never in connection with Harvey Springs.

The Harvey guarantee is protective insurance for the purchaser and the dealer.

*Harvey dealers are furnished many sales helps.  
Write for book giving complete information and  
specifications for over 1500 kinds of Harvey Springs.*

**Harvey Spring & Forging Co.**  
1047 17th Street  
Racine, Wis.

## APCO Equipment for FORDS

### Stop that rattling Steering Wheel on Your Ford

The steering column brace eliminates all vibration of the wheel and holds it solid. Other cars use one - *Fords Need It.*

Sold by dealers everywhere, or prepaid on receipt of price.  
Apco Mfg. Co., Providence



### Puts Your Ford Horn where you can reach it. It is

attached to the throttle or gas lever where it is under the driver's finger at all times.

**APCO Horn Button**  
consists of button, bracket and wire  
Sold by dealers everywhere, or prepaid on receipt of price  
Apco Mfg. Co., Providence, R. I.

### Does Your Ford Wander off the Road? **APCO**

#### FRONT AXLE BRACE

Holds axle firmly in position, reinforces front radius rod preventing bending and breaking. Stabilizes the whole front of your car.

At your dealer or send his name with your order direct to  
Apco Mfg. Co., Providence, R. I.

**\$2.50**



Also made in Angle Steel - **\$1.50**

### Hitting on all Four

The testing valve in the new **APCO MUFFLER** tells you at once and finds the skip if there is one. It can't explode, loosen or rattle and is designed to muffle the exhaust without back pressure.

At your dealers or if not sent direct on receipt of price,  
APCO MFG. CO. PROV. R. I.

**\$5**

COMPLETE

**MAKES YOUR  
FORD  
MORE CAR**

### Is Your Ford Full of Rattles?



**STOP** this source of annoyance and danger at once with—**APCO Anti-Rattlers**  
Heavy springs automatically take up the wear  
Radius Rod 1 in a box 60c ea.  
Steering Rod 2 in a box 60c pr.

At your dealers or send his name with your order direct to  
**APCO MFG. CO.**  
Providence

**Send for Our Catalog  
and Price Lists**

**APCO MFG. COMPANY**  
Providence, R. I.

### Wakefield Brass Co. Has Program of Dealer Co-operation.

Under the startling title, "Help!" the F. W. Wakefield Brass Co. of Vermilion, Ohio, has issued a compact leaflet describing its program of dealer co-operation. Not "dealer help" but "sales help" is the policy of the manufacturers of the Red Spot searchlight.

"We have no fool notion that the progressive, worth-while dealer will or should sink his individuality behind our trademark," writes Gerald L. Basil, of the Wakefield company. "Therefore the 'help' we offer is mutual help, designed to enhance the dealer's local prestige at the same time it builds business for both him and us."

The circular describes briefly "Red Spot" direct advertising, leaflets, store cards, stickers, catalog and newspaper cuts, and the new self-seller display stand recently offered. The "Red Spot" organization emphasizes its policy of distributing through jobbers exclusively, although dealer co-operation is offered direct where desired.

Dealers should write to the F. W. Wakefield Brass Co., Vermilion, Ohio, for copies of the leaflet. Mention the American Garage & Auto Dealer when you write.

### Automotive Educational Bureau Offers Practical Course.

Thousands of persons are operating cars more or less successfully, but the fact remains that only a small percentage really understand their machines or are capable of maintaining them. This is proved by the increasing number of garages and service stations. Of the many thousands working in garages and service stations but few have a real, thorough knowledge of their business and the real, expert automobile mechanic is rare.

The opportunity of getting training in the principles underlying this line of work and in the application of such knowledge is now offered by the Automotive Educational Bureau which was recently organized for the purpose of publishing a series of simple, thorough, and absolutely practical instructions on automotive work.

These instructions are said to have been prepared by experts of long experience and proved ability and are furnished by individual correspondence service which is arranged to suit the individual needs of subscribers.

For the subscriber who does not require special service, the bureau has a regularly outlined series of instruction papers in which the subjects are presented in the order of their importance from a trouble and repair point of view. Ignition is the first subject, and then the carburetor, etc. In addition to receiving regular instructions on automotive work, the subscriber is given the privilege of asking the bureau for advice or information pertaining to his studies or to any problems that may arise in his daily work.

Further particulars will be given to those who write the Automotive Educational Bureau, 1203 Farnam St., Omaha, Neb., mentioning the American Garage & Auto Dealer.

### Safety First Exposition to Be Held in San Francisco in August.

The National Traffic Officers' safety first exposition will be held in conjunction with the convention of the National Traffic Officers' Association at the San Francisco Exposition Auditorium, August 23 to 27 inclusive.

The main purpose of the convention is to obtain a national viewpoint on uniform traffic regulations to be presented to the various state legislatures for action and to find the best means of presenting the "safety first" idea to the people of the nation. Committees of endorsement will have authority to test, according to specification, the various classes of devices like lenses, signals, locks, non-skid tires, brakes and other devices possessing safety merit, and issue certificates of endorsement.

Lectures on traffic and accident prevention subjects by men who enjoy national reputation will be a feature of the convention.

A complete headlight testing laboratory will be installed under the direction of Dr. Clayton H. Sharp. Films upon "safety first" subjects will be displayed and many additional features and exhibits are being worked out which will make the most complete and instructive convention and exposition of this kind ever held.

### Durston Gear Corp. Increases Manufacturing Capacity.

Increased demand for the products of the Durston Gear Corp., of Syracuse, N. Y., has made it necessary to double the size and capacity of their already large plant. They have also recently brought out a new model transmission which in design represents the most up-to-date engineering and mechanical features.

The gears and shaft of the new model are nickel steel throughout. The main shaft is mounted on annular ball bearings, and the counter-shaft gear set is of the cluster type, rotating on a fixed shaft.

All transmissions, it is stated, are tested in a sound-proof room to insure the quiet running which is so essential in the modern motor car. Easy shifting of gears is also one of the prominent features of the new product.

### National Safety Council Plans for Accident Prevention.

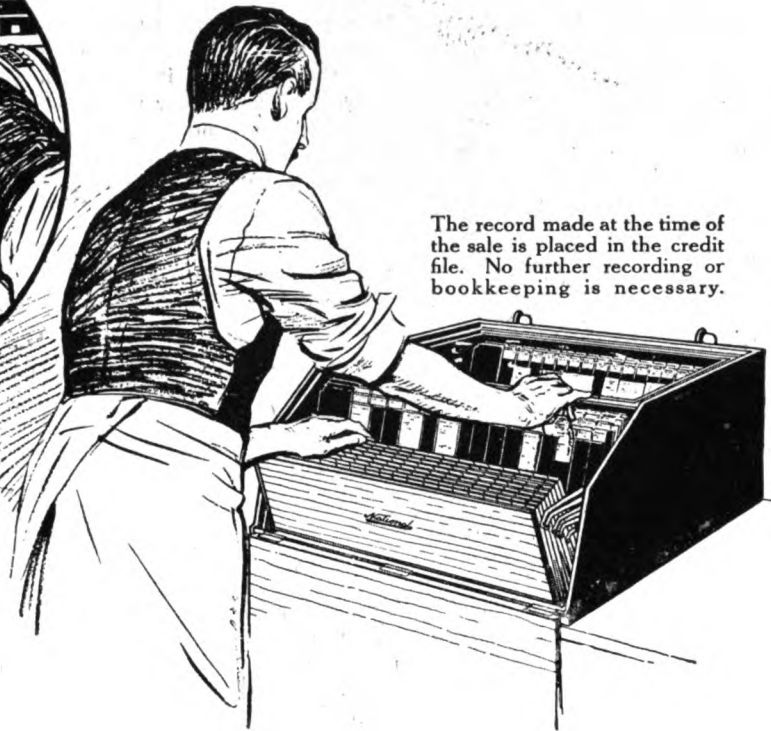
A study of the relation between the number of automobile accidents and the number of motor vehicles in use in the United States makes some startling revelations.

The Wall Street Journal estimates that





The clerk makes a complete record at the time of the sale.



The record made at the time of the sale is placed in the credit file. No further recording or bookkeeping is necessary.

## One writing completes the record of a charge sale

by the N. C. R. method of handling credit accounts

**Fill out this coupon and mail it today**

Dept. 27  
The National Cash  
Register Company  
Dayton, Ohio

Please give me full particulars about the N. C. R. Credit File way of handling credit accounts.

Name \_\_\_\_\_

Business \_\_\_\_\_

Address \_\_\_\_\_

After the clerk makes the original record at the time of the sale, no further recording, posting, or bookkeeping is necessary until money is paid on the account.

And every account is always kept up to the minute—ready for instant settlement.

Thousands of merchants in many lines of business are now using this up-to-date N. C. R. Credit File.

They find it is the safest, quickest, and most economical credit system they could use. It saves them time and money.

The National Cash Register Company, Dayton, Ohio  
Offices in all the principal cities of the world

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

there are now 7,600,000 automobiles and motor trucks in the United States. An automobile or truck to every third family; one to every 14 persons.

The National Safety Council states that reports indicate that during recent years automobile accidents have resulted in approximately one-half the number of deaths caused by industrial accidents of all sorts. In Chicago, alone, 420 persons were killed in automobile accidents during 1919.

Even more alarming is the fact that in almost every case a comparison, year by year, of the number of automobile deaths and the number of automobiles in use indicates that the deaths are increasing in almost exact mathematical ratio with the increase in the number of automobiles.

The National Safety Council announces that it has declared war on the avoidable automobile accident and has enlisted the aid of practically every interest concerned in its campaign.

A score of men, each representing some big industry interested in automobile safety, have organized themselves into a committee to develop a series of 12 bulletins and lessons on the chief phases of automobile and truck safety. Each man is to furnish all information and material available from the experiences of his own company. A series of illustrated bulletins and lessons will be developed from this material and will constitute the first authoritative standards on safe practices in the operation and maintenance of motor vehicles.

These bulletins and lessons will be designed and sold by the Council as a special service to automobile and truck owners, automobile clubs and manufacturing associations, insurance companies, garages and

other interested agencies. They will be the basis for the lessons in all subsequent chauffeur schools conducted by the various local safety councils.

After the drafting of the bulletins and lessons, they will be submitted to 100 experts for criticism and suggestions.

This marks the first attempt on a large scale to reach the individual drivers of automobiles and motor trucks with a plan of accident prevention. The idea for this service grew out of the success of the chauffeurs' schools conducted in St. Louis, Pittsburg, and other cities.

### Vigilance Committee Organized to Prevent Altering License Plates.

Counterfeiters in Nebraska have turned their attention to altering automobile number plates. The state highway department has control of licenses in that state, and the other day its inspectors uncovered a case where, in order to save ten dollars, a fellow had taken an old 1918 plate and after considerable filing, punching and bending, removed the "18."

He then took a 1917 plate and extracted therefrom the "19." This he bolted snugly in place alongside the "19" that remained in the 1918 plate, and credited himself with ten dollars. A knife was used to remove the yellow paint, but this was not well done, and a keen-eyed inspector "landed on him." The three little bolts that held the new digits helped the investigator to detect the make-up.

At Fremont, another carpenter flattened the "8" into a "9" and he thought he had made money at it until he discovered, through an inspector to his chagrin, that they weren't wearing yellow 1920 numbers.

In Chadron, when a man was nailed for using a 1917 number, his excuse was that he used the car so little that he hadn't supposed it made any difference. At Valentine, a mailman explained the absence of a license number on the theory that an employe of Uncle Sam didn't have to have a number.

At Rushville, a car without any number at all was found, but the owner produced from the tool box a brand new 1920 plate. He said he didn't like to get it all splashed up and bent. The Beatrice fire chief was found using a rigged-up paper number that took more time to make and attach than would have been necessary to go and get the free number to which he was entitled.

State Engineer Johnson, of Nebraska, who has charge of the automobile licenses and highways of the state, is organizing every automobile owner into a vigilance committee to see that every machine using the road has a license number, and that each motor vehicle has the right kind of a number.

### Paragraph.

THE FLEXLUME SIGN CO., Niagara and Potomac Ave., Buffalo, N. Y., which has sold a considerable number of Oplex electric signs to garage owners and automobile dealers, will be glad to put any garage or automobile dealer on its mailing list to receive copies each month of its house organ entitled "Oplex Signs." Or if any one is interested in getting information and the approximate cost of a Flexlume sign, the company will prepare a drawing of an appropriate sign and submit quotations on request. Mention this magazine.



**Foster**

**Auto Repair Creeper**  
ALL METAL CONSTRUCTION

Angle Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

**FOSTER BROS. MFG. CO., UTICA, N. Y., U. S. A.**

**\$5.00**

Ask for the name of the Foster distributor in your territory.

**DIRECT REPRESENTATIVES**  
Eastern and Southern States: Asch & Co., 16-24 W. 61st St., New York, N. Y. For the Mid-West: Jessop & Thompson, 1421 S. Michigan Ave., Chicago, Ill. Pacific Coast & Inter-mountain Territory: McDonald & Linforth, 739 Call Bldg., San Francisco, Cal.

## HARNER'S ALUMIFLUX REPAIRS ALL METALS

All repairs can be made with ALUMIFLUX without removing the part from the car. ALUMIFLUX will work successfully with aluminum, copper, iron (gray, malleable, or galvanized), tin, zinc, lead or brass.

Not affected by gasoline, oil or water, hot or cold. Will stand heat up to 600 degrees and pressure to 250 pounds.

Write for full particulars

**E. C. HARNER MFG. CO.**  
BENTON HARBOR MICHIGAN

## AUTOMOTIVE "EQUIPMENTLY" SPEAKING

OUR LOCATION HAS ENABLED US TO BECOME

QUICK SHIPPERS

IN EQUIPMENT, REPAIR MACHINERY AND ACCESSORIES FOR THE "BIG FIVE"

**Motor Car—Motor Truck—Tractor—Motor Boat—Aeroplane**

WE ARE TERRITORIAL DISTRIBUTORS FOR

Service Station Equipment Co. Inc., of Chicago, Ill.

"AMBU" Battery Station Appliances

Firestone Demountable Rims.

ESTABLISHED 67 YEARS

**BECK & CORBITT**

AUTOMOTIVE EQUIPMENT

1222 to 1244 North Main Street ST. LOUIS, U. S. A.

# ECLIPSE ELECTRIC VALVE GRINDER

**with Famous Ballistic Movement**

The best and easiest way to grind valves is with a light, rugged, well balanced, portable power-driven tool with ample power. All of these features are embodied in the New Model Eclipse—

***the tool that rendered  
hand grinding obsolete.***

This grinder is a notable example of machine labor replacing hand labor. It is invaluable in automotive factories, garages, repair shops and service stations.

The Eclipse Valve Grinder not only does a much better job than the hand methods, but does it much more quickly and at a fraction of the cost.

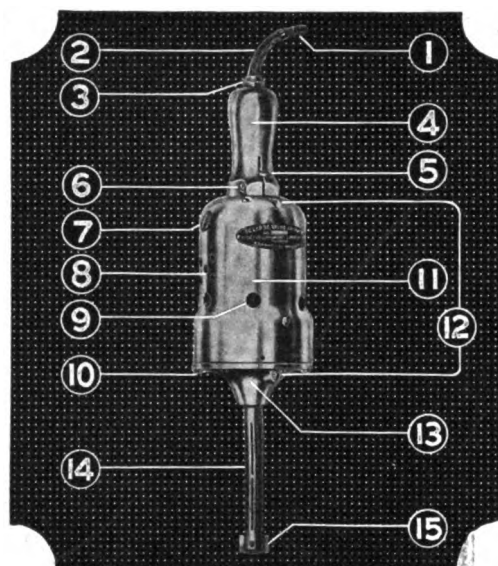
Write today for complete information.

**ECLIPSE VALVE GRINDER CO.**

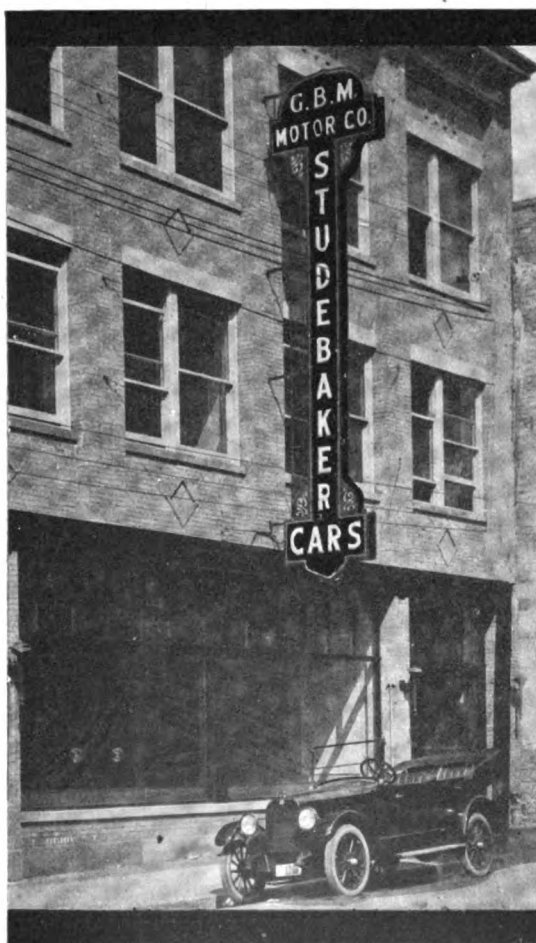
Department C.

20th St. at Oak,

Kansas City, Mo.



1. Flexible Cord
2. Wire Cord Protector.
3. Cord Clamp Nut
4. Detachable Handle
5. Trigger Switch
6. Handle Clamp Screw
7. Accessible Brush Holders
8. Motor Ventilating Holes, Intake
9. Motor Ventilating Holes, Exhaust
10. Six Flange Screws
11. Main Housing
12. Ollers for Three Bearings
13. Cover Flange
14. Oscillating and Rotating Shaft
15. Valve Bit



## Make the Sign Suit the Car

O PLEX Electric Signs have personality—a suggestion of grace and careful thought to detail—which peculiarly fits them to tell the story of the high class motor car.

That is why many makers have standardized on Oplex designs. It is the reason the finest show rooms tell their story in Oplex glass letters.

The distinguishing mark of an Oplex Sign is that the letters are of raised, snow-white glass, standing out in relief from a darker background. This makes them excellent day signs as well as night signs. At night all the light is thrown through the openings which form the glass letters. Other Oplex advantages are greatest reading distance, lowest upkeep cost and most artistic designs.

Let us send you a sketch showing how *your* Oplex Sign will look.

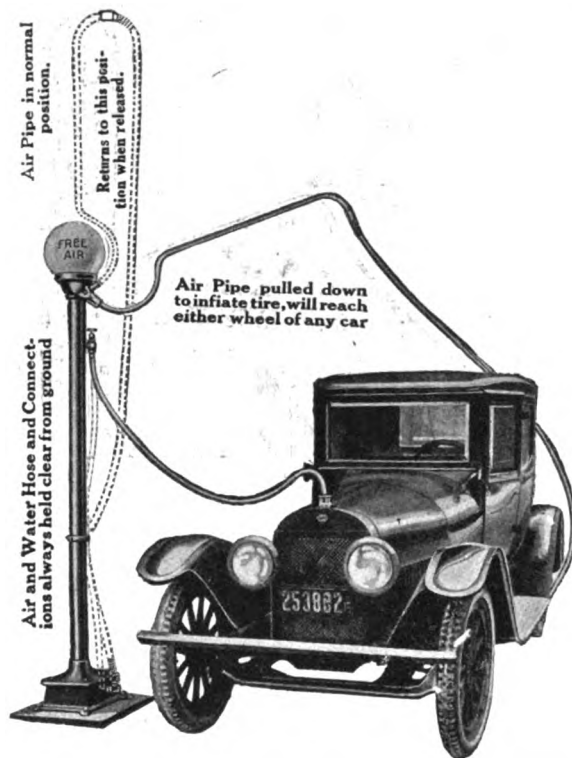
**THE FLEXLUME SIGN CO.** ELECTRICAL ADVERTISING  
Niagara & Potomac Ave., Buffalo

Pacific Coast Distributors  
Electrical Products Corp.  
Los Angeles, Cal.

Canadian Factory  
The Flexlume Sign Co., Ltd.  
Toronto, Ont.

# THE ROMORT AIR & WATER STATION

## Twice the service in half the time



### IT'S PLAIN TO BE SEEN

That the garage man who is spending more effort, to render more service to more motorists—will have more business and more profits.

The Romort Air and Water Station not only renders more, but the best air and water service on the market.

#### A Sales Builder

Car owners go out of their way to use the Romort, for they know the air hose will be free from dirt and grime, for it never touches the ground and water service will be available at the curb without trouble and loss of time.

#### Always on the Job

Twenty-four hours a day this sturdy business builder is on the job making new customers and holding the old ones. It is by far the most effective, economical, and permanent advertising that you can buy. Built in two styles, with and without water.

Write Today for Full Details

Manufacturer

**THE ROMORT MFG. CO.**  
Oakfield, Wis.

Sales Dept.

**THE ZINKE CO.**  
1323 Michigan Ave., Chicago, Ill.

## Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

**Over 350,000 sets now in use**

Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

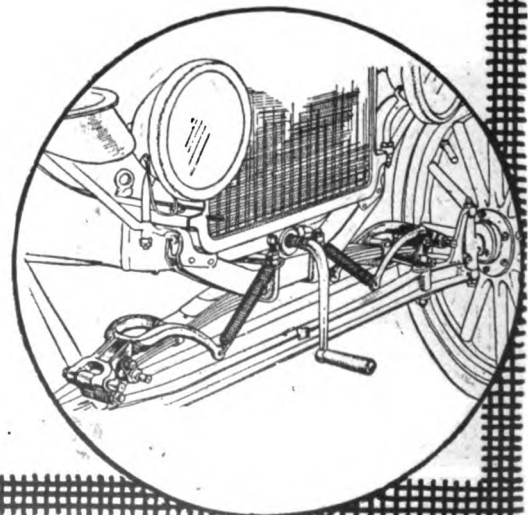
**Price \$12.00 per set of four.**

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

**P. H. Webber Company**  
HOOPESTON, ILL.

Chicago Sales Office:

WALTER ECKHOUSE & CO., 616 S. Michigan Ave.  
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Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



# FINCK'S

**DETROIT SPECIAL**  
**OVERALLS & COMBINATION SUITS**

Nothing Like  
Finck's  
for Garage Work



The roominess of Finck's Garments means the utmost comfort, no matter what position you work in. They are made big to begin with and fit after washing.

There's no binding, no tightness, and no straining, and because they fit they wear. That's guaranteed by the "Pig" label. Ask your dealer or write to us for your next suit.

**W. M. FINCK & COMPANY**  
Detroit, Michigan

Manufacturers of High Grade Overalls, Men's and Women's Combination Work Suits

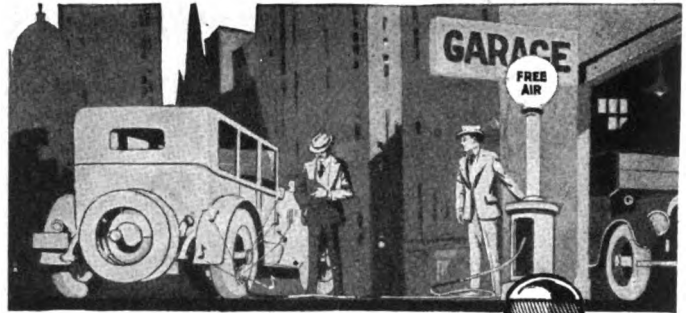
Branches:

St. Louis, Mo.; Dallas, Tex.; Seattle, Wash.;  
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(57)



## The Whistler

TRADE MARK  
IT WHISTLES WHEN IT'S HAD ENOUGH

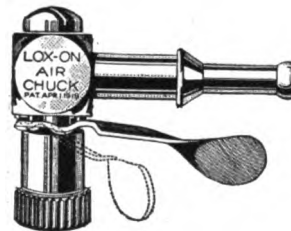


"It Whistles When  
It's Had Enough"

WITH the Whistler Pressure Regulator on your tires you don't have to worry about over or under-inflation. Just screw the Whistler on your tire valve—set it for the pressure desired—attach the air hose and forget to worry. At exactly the right time, a cheery little whistle announces "enough"! You can't put any more air in—for the Whistler automatically closes.

Correct inflation means saving 50 to 75% on tires; 20% on gasoline and a large percentage of repairs, time and trouble. Leave the Whistler always on your tire valve—it looks better and is more convenient. \$4.00 per set of four.

**LOX-ON**  
TRADE MARK  
**AIR CHUCK**  
DON'T RUB THE RUBBER



You don't have to push the Lox-on Chuck down over the valve. It slips over it and then grips it! That's why the rubber lasts indefinitely and it is absolutely guaranteed not to leak. It saves electric bills, cuts down wear and tear on pumps and increases the efficiency of your air-hose connections. \$3.00 each.

Dealers are enthusiastic over this proposition. It is one of the best sellers in their stores. Turnovers are quick and profitable. We furnish attractive cards and literature that will help you increase your business on this popular line.

Ask your jobber or write us for details.

*The Whistler is used as regular equipment on Dural Antimony Hand Made Tubes.*

**Automatic Safety Tire Valve Corporation**  
1753-1755 Broadway, New York City  
Factory: Long Island City, New York

Air! the life  
of the tire  
depends on it

Do not be afraid to press  
the purchase of a  
**SCHRADER UNIVERSAL  
TIRE PRESSURE GAUGE**  
on a customer.

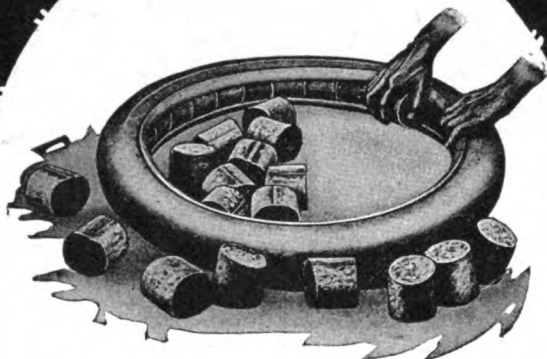
He will thank you for it  
after he discovers the  
saving in both tires and  
gasoline that it makes  
possible.

Price \$1.50

**A. Schrader's Son Inc.**  
783 Atlantic Ave., Brooklyn, N.Y.



# The TIRE FILLER that has made good



## Trouble-proof tires with ample resiliency

is a combination that was long sought by the motoring public. Some tire fillers failed to stand up under long service—most of them lacked the essential resiliency. But these two vital qualities were at last combined in

# NATIONAL RUBBER TIRE FILLER

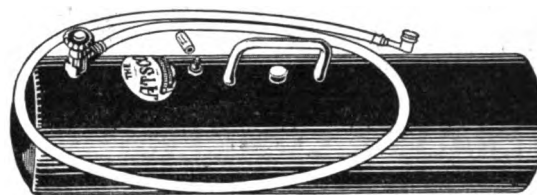
It has brought joy and satisfaction to tens of thousands of car and truck owners. It has done away with punctures, vulcanizing, patching, tire repairs of all kinds. Users get 10,000 to 20,000 miles out of every tire.

Besides, National Tire Filler has a wonderful resiliency. It takes the place of air, rides as easy, and does away with the inner tube.

National Rubber Filler is made of the best grade of rubber, cut in small particles, treated, moulded and vulcanized by our special process. The result is a compound that is light, strong and resilient. Made in sizes to fit all standard tires. It is laid in the tire and not melted or poured in. Will not harden, freeze, or melt—fully guaranteed against deterioration in any form.

DEALERS—National Rubber Tire Filler sells because it has made good. It combines comfort with economy of tire upkeep. We have a fine proposition for you. Write us today.

**National Rubber Filler Co.**  
210 College St. Midlothian, Tex.

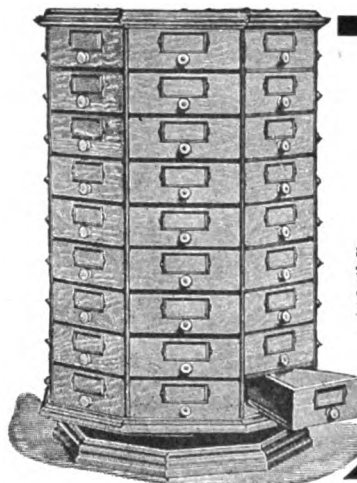


## You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

**Air-Tight Steel Tank Company**

**Pittsburgh, Pa.**



## Keep your supplies in revolving cabinets like these

Systematic! Conveniently Accessible! Just like "rolling off a log" to look up bolts, screws, etc., with this revolving cabinet. Everything at your finger tips, with nothing to burden your memory. Used by leading garages of this country.

Buy today from your jobber.  
Catalogue on request.

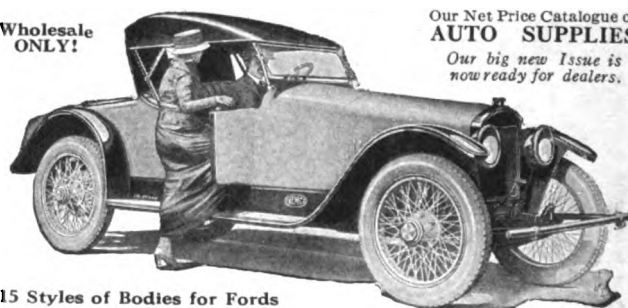
**American Bolt &  
Screw Case Co.**  
DAYTON, OHIO

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ONLY!

Our Net Price Catalogue of  
AUTO SUPPLIES

Our big new Issue is  
now ready for dealers.

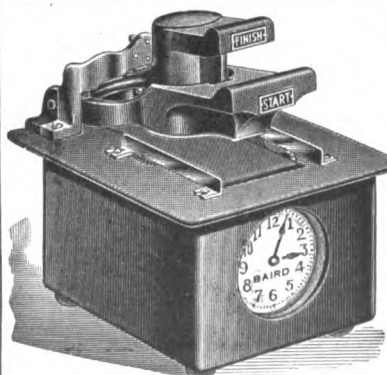


15 Styles of Bodies for Fords

Make Money Equipping old FORDS with these classy "\$50 AND  
"Fidelity Bodies" listed in "THE LITTLE SALESMAN"

**NEW ENGLAND MILLS CO., 1027 W. Van Buren St., Chicago**

## Put your repair charges on a profitable basis with



## BAIRD TIMING DEVICES

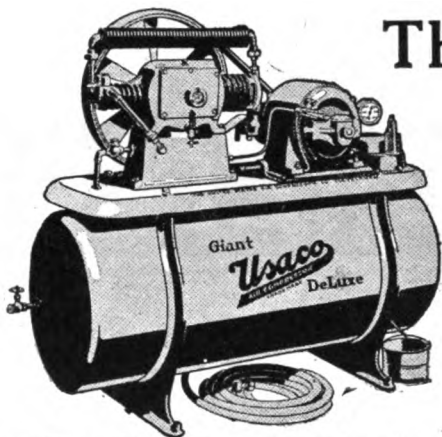
Keep a check on your employees' time and learn exactly what each job costs. Automatic supervision turns losses into profits.

Prices moderate.  
Write today for booklet.

**Baird Equipment Co.**  
324 W. Ohio St., Chicago  
Phone Superior 2071

# A Measure of Motor Protection Never Before Known Is Afforded by

## The Usaco Unloader →



The Usaco Giant De Luxe, capacity 7 cu. ft. per minute. Has 60 gallon tank tested to 500 pounds and suitable for working pressure of 250 pounds. Of the same general design as the Standard but with greater capacity, having a more powerful motor and a tank with double the capacity. Particularly adapted for the gruelling service encountered in inflating giant truck tires, a service which it handles with gratifying speed and ability. Also furnished in portable form. The Usaco Standard De Luxe, capacity 4 cu. ft. per minute. Has 30 gallon tank tested to 400 pounds and suitable for a working pressure of 200 pounds. A completely automatic unit of the highest quality. Furnishes high pressure air in great volume for tires of all sizes and pressures and is quiet running and foolproof. Also furnished with 60 gallon tank or with wheels to provide portability.

NOT alone at starting but also at times of low line voltage, the Usaco unloader automatically operates and protects the motor against burning out. And, in affording this double protection, the Usaco Air Compressor is distinctly alone.

In starting, the automatic controller "cuts in" and the motor runs on the brushes, pumping against no pressure, until maximum speed is attained. Then the brushes throw out, closing a small valve and causing the compressor to immediately assume normal operation. This eliminates the possibility of carrying the load under low voltage, and avoids the cause of burned out motors and similar troubles.

When the voltage drops, as it frequently does when power and light users make sudden demands upon the line, the Usaco Unloader protects the motor, the brushes fall back on the armature and the unloading valve opens. The motor then pumps against no pressure until the voltage returns to normal, when it resumes pumping as hereinbefore described.

This is but one of the several improved and exclusive features which place Usaco Two Stage Air Compressors distinctly in a class by themselves.

**The United States Air Compressor Co., Cleveland, Ohio**

MAKERS OF

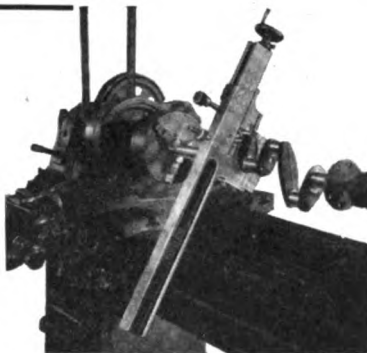
**TWO-STAGE**

**Usaco**  
AIR COMPRESSORS

**✓✓✓ AIR COMPRESSORS**

**No Filing  
No Offsetting  
No Jigs**

The Weber Tool turns ALL Pins from ONE setting of the Crank Shaft, ON CENTERS. It is the only Tool of its kind that will leave a pin absolutely parallel to the main bearings. The cutter used is a Forming Tool, cutting entire width of pin at once. A micrometer dial enables operator to gauge his cuts and turn all pins to a uniform size.



Perfected and Proven

## Weber Crank-Pin Re-Turning Tool

How many times have you assembled a gas engine, knowing full well that the crank shaft needed truing up? You did not want to send it out and delay your customer. You knew, too, that it would cost considerable to have it done.

With the Weber Tool you can do this work whenever necessary. NO DELAY—NO EXPENSE.

Why not do this work in your shop and have more satisfied customers and put more profits in your own pocket?

The Weber Tool is guaranteed to turn crank-pins within as close limits of accuracy as any other known method.

Picture at top shows Weber Tool in operation on 4-throw Crank Shaft. All four pins are turned and finished from this one setting. Write for Circular and prices.



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## Eckern's Motor Stand for Ford Motors

The handiest device of its kind for Ford engine work. The Ford motor when taken from a car can be fastened to the stand by two screws at water inlet connection. The part of the stand which is screwed to the motor can be revolved or locked tight holding the motor in any position or any angle desired by the workman.

It also has a handy tool tray for wrenches, parts, etc. Mounted on wheels so it can be moved from place to place. List price \$20.00.

We also manufacture Eckern's Portable Work Bench and Engine Stand (an exceedingly complete outfit)—List Price \$40.00; and Eckern's Shop Bench Motor Support—List Price \$10.00; and Eckern's Axle Attachment for these stands—List Price \$6.00.

Ask Your Jobber or Write for full information

1412-14 S. Michigan Av

**J. G. Paro Co.**

CHICAGO, ILL.

# You get a good share of the profit.

The **MODEL "N" MARVEL CARBURETER** improves car performance, and increases mileage from 22 to 25 miles per gallon.

No changes are necessary to install it. Fits right in place of regular installation.

## MARVEL CARBURETER

*Designed especially for FORDS*

sold on 30 days' trial, with money back if not satisfactory.

Price F. O. B. Factory \$10.00

**MODEL "E" CARBURETERS** are standard on Buick, Oakland, Nash, Scripps Booth, GMC, Wilson and all ¾-ton U. S. A. Government Trucks.

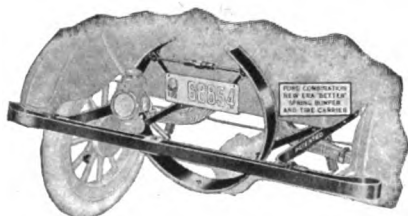
**MODEL "E" Carbureters** greatly improve Maxwell, Overland, and Studebaker cars.

*DEALERS--If interested, write for further information*

**MARVEL CARBURETER COMPANY**  
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## NOW OR LATER



A New Era "BETTER" Spring Bumper can be quickly—easily fitted—**after** a Tire Carrier has been installed—or any New Era Tire Carrier can be fitted **after** a New Era Bumper is on.

Like all New Era products the Combination doesn't overload the attaching arms, but stays put—without rattle or vibration.

|                                                     |         |
|-----------------------------------------------------|---------|
| Ford Rear (or front) Bumper.....                    | \$12.00 |
| Ford Single Tire Carrier.....                       | 6.00    |
| Ford Double Tire Carrier.....                       | 8.00    |
| A Cradle Tire Carrier can be used if preferred..... | 5.50    |

Ask for our **unusual** catalog also showing Bumpers, Carriers and Springs for every Car, and name of nearest Jobber.

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**TORIT LEAD BURNING OUTFIT**, designed especially for battery repair work, but suitable for radiator work, soldering, brazing and light welding, such as fenders, brackets, etc. *Most convenient and profitable around the garage.*

**TORIT WELDING OUTFIT**, the ideal outfit for the auto repair shop. No garage is complete without a welding outfit, and no work is more profitable. *Let us tell you about the TORIT.*

**KEROSENE PREHEATING TORCH**—For the shop where considerable welding is done a preheating torch will save time and gas, and will help to give better welds. Quicker, cheaper, and more convenient than charcoal.

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*We conduct the largest and best-equipped welding shop in the Northwest. Crank cases, cylinders, etc., handled by experts.*

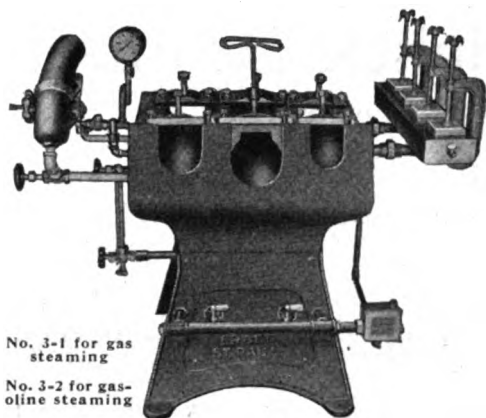
We **GUARANTEE** the finest kind of **ALUMINUM** work

**St. Paul Welding & Mfg. Co.**

172 West Third St.

St. Paul, Minn.





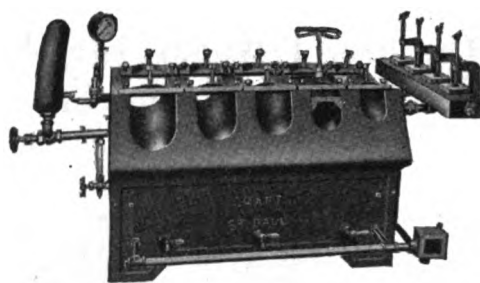
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## CRAFT

Combination Steam Vulcanizer  
Oldest on the Market  
Ten Year Guarantee

The Craft No. 5 is a complete Workshop in itself, having the greatest range of capacity. A cavity for every size of tire. Always carrying a steady and even temperature and is most economical to operate.

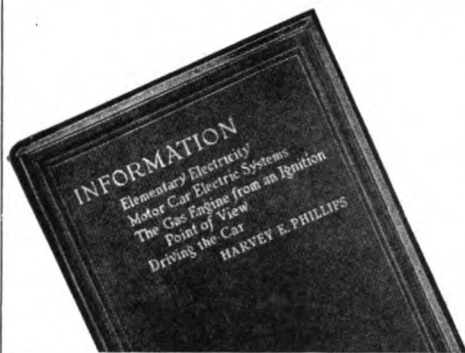


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Sixty-four Motor Car Manufacturers have adopted our service methods, testing instruments and publications. We help mechanics and repairmen to lessen their troubles, eliminate guess work and do their work better.

Our testing instruments will enable you to locate electrical troubles quickly and accurately.

Our 500 page INFORMATION Book is full of simple instructions together with wiring and circuit diagrams. Price, \$2.50.

Write today for complete catalog and full details.

**H. E. PHILLIPS & CO.**  
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Model 502 Test Set  
Price \$25.00 prepaid to you

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for service and reliability

The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

Write today and feel free to consult our Engineering Department.

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## MONEY in OLD TIRES

Send them to us

Even if they are punctured, rim cut, sand blistered or blown out. We remake them by a process that gives them at least 5,000 more miles. You can sell these tires at a good profit.

### PRICES

| SIZE     | If you furnish 2 Casings | If you furnish 1 Casing | If I furnish Both Casings | Special Gray Tube |
|----------|--------------------------|-------------------------|---------------------------|-------------------|
| 28x3     | \$3.00                   | \$ 4.75                 | \$ 6.50                   | \$1.80            |
| 30x3     | 3.25                     | 5.00                    | 6.75                      | 1.90              |
| 30x3 1/2 | 4.00                     | 6.00                    | 7.25                      | 2.40              |
| 31x3 1/2 | 4.25                     | 6.75                    | 8.00                      | 2.50              |
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| 34x3 1/2 | 4.50                     | 7.50                    | 9.25                      | 2.65              |
| 31x4     | 4.50                     | 7.75                    | 9.50                      | 3.10              |
| 32x4     | 4.75                     | 8.00                    | 10.00                     | 3.20              |
| 33x4     | 5.25                     | 8.25                    | 10.25                     | 3.30              |
| 34x4     | 5.50                     | 8.50                    | 10.50                     | 3.40              |
| 36x4     | 5.75                     | 8.75                    | 11.00                     | 3.50              |
| 34x4 1/2 | 5.75                     | 9.00                    | 11.50                     | 4.10              |
| 35x4 1/2 | 5.75                     | 9.25                    | 12.00                     | 4.25              |
| 36x4 1/2 | 6.00                     | 9.50                    | 12.50                     | 4.35              |
| 37x4 1/2 | 6.00                     | 10.00                   | 13.00                     | 4.45              |
| 35x5     | 6.25                     | 10.50                   | 13.50                     | 5.00              |
| 36x5     | 6.25                     | 11.00                   | 14.00                     | 5.20              |
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Further information on request.

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804 Commercial Avenue, Cairo, Ill.

## You Don't Guess the Answer You READ It on the Blade

Cylinder measurements guaranteed accurate to within .00025" and less.



## The AM-P-E-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

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PRICE \$2.50

**AM-P-E-CO SALES CO.**  
MARSHALLTOWN, IOWA

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will pay **\$100**

if they fail to duplicate any part of any make of automobile or truck foreign or domestic, submitted to them. That sum will be paid to the person sending the order.

Parts of any machine can be duplicated in 1 to 3 days' notice. All welding is done at their risk. Do not compare this work or welding with that of others. If you have a broken part or parts that others cannot weld or repair, send them to Pondelick's. They increase the durability of many parts—even where the manufacturers fail.



Supply your customers with "Pondelick's" anti-leak piston rings, and you insure them against engine trouble.

They have the largest and best equipped plants in the United States for the repair or reproduction of automobile parts.

Cylinder regrinding, new piston, special casting, heat treated, Pondelick's self-adjusting, anti-leak piston rings, new wrist pin, hardened and ground, bushing made of genuine bronze, including fitting and assembling of connecting rod to piston for \$15.00.

Reputation, not competition, determines our policies. Visit our plants and be convinced. Ask anywhere or anybody about our work.

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Main Office, Leavitt St. and Jackson Blvd.

**Pondelick Brothers, CHICAGO ILLINOIS**

## Atlas Crankshaft Grinder

Don't attempt to scrape a bearing to crank pin that has worn oval and don't pay a machine shop \$15 or \$25 for a lathe job. Buy an

### Atlas Abrasive Tool

It will true up a crankshaft to less than one-thousandth of an inch in less than one hour without removing shaft from crankcase. Adjustable to all crank pins from 1½ to 2½ in. diameter. But one tool needed, cutters good for truing 10 to 20 pins. Use same bearings, just enough is removed to true. Rebabbiting unnecessary. 5000 in. use. Send for Atlas Garage Unit information. A machine for testing and straightening crankshafts, Gear press with housing assembly and piston vice attachments.



Price complete, \$10.00  
net. Prepaid.  
Extra cutters 30 cents each.

**ATLAS MANUFACTURING COMPANY**

702 N. Canal St.

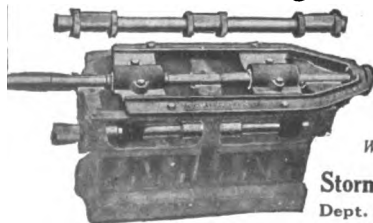
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# STORM

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installed in your garage will double your profits and give you a reputation for *quick, accurate* repairing.

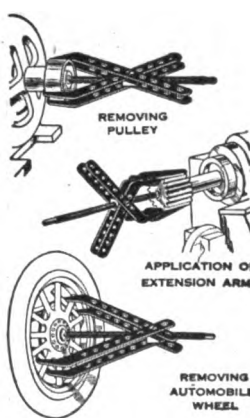
### he Storm Main Bearing Babbitting and Boring Tool



for Ford and Fordson Motors—puts in new, perfect bearings exactly the same as the original and in the proper position.

Write today for complete information

**Storm Manufacturing Company**  
Dept. E Minneapolis, Minn.



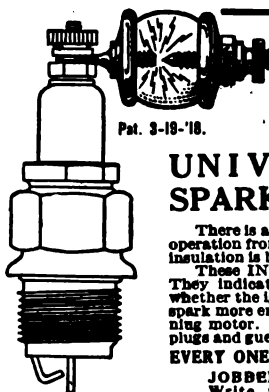
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Pulls any gear, wheel or pulley anywhere in a jiffy. Built on the only correct principle. Produces maximum efficiency with minimum effort. Can't twist off or let go. **THE HARDER THE PULL—THE TIGHTER THE GRIP.** Reduces operating cost and increases the earning capacity of any Repair Shop. Made from best grade drop forge steel. Almost unbreakable. Adjustable up to 13 inches diameter. Satisfaction guaranteed or money refunded. Order or write for details today. Price complete with extension arms, \$12.00.

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**Premier Motor Products Co.**

3954 North Robey Street Chicago, U. S. A.



## Spark Plug Troubles Are Rare Occurrences

on the car equipped with

## UNIVERSAL or MARVEL SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon. These **INTENSIFIERS** will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

**EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM**

**JOBBER and DEALER—Your profit is liberal.**  
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Public approval is the soundest possible basis upon which to build your business. For upward of thirty years we have been pre-eminent throughout the world in the manufacture of Electrical Measuring Instruments. Today, the

# Weston

Model 354  
**AMMETER**

which is advertised in the National magazines with circulations reaching into the millions, is used on a very large percentage of the highest grade domestic and foreign cars. A Weston Ammeter will increase your reputation and your business. It is the only absolutely reliable safeguard for the battery. There is a good profit for you. Write us.

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*Branches in All the Principal Cities*

## HOLD 'EM IN THE ROAD

Gives the Ford driver better control over his car, preventing breakage, repairs and accidents.

Combines four valuable attachments in one—Radius Rod Brace, Anti-Rattler, Axle Support and Steering Device.

DEALERS—This is the most essential of all Ford necessities. Ask your jobber or write for particulars.

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"CASCO" Fan Belt Guide "CASCO" Oil Drain Cock  
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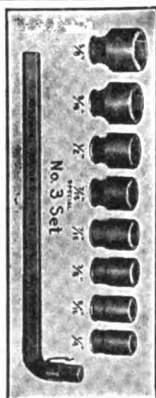
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*High Compression*  
**PISTON RINGS**

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## Best for Garage Work Graham Socket Wrenches

Known throughout the automotive industry for their unexcelled strength and reliability. Turned from the best solid bar stock and heat treated.

No. 3 Set, shown herewith, meets the needs of garages and large cars. Eight sockets and handle packed in neat canvas bag.

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**Watch for this Tag**

It will introduce to you a complete line of automobile repair equipment, tested and approved by the Ford Motor Company and backed by the "Fairbanks O. K." Sold by leading jobbers everywhere.

**THE FAIRBANKS COMPANY**

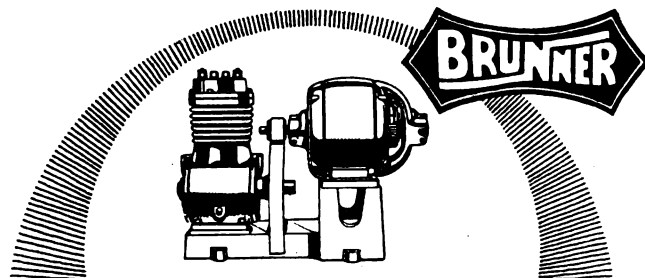
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Eastern — NEW YORK Southern — NEW ORLEANS  
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are making money for hundreds of garages and service stations. The rapid movement of the ram makes this press superior to other makes of presses.

We manufacture Hydraulic Presses, Pumps and Valves for any purpose which requires pressure. *Write for Catalogue*

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 Apco Mfg. Co., Providence, R. I.  
 Beck & Corbitt Iron Co., 1223 No. Main St., St. Louis, Mo.  
 Casco Mfg. Co., Thomasville, Ga.  
 The M. W. Dutton Co., Providence, R. I. (Radiator Core.)  
 New England Mills Co., 1027 W. Van Buren St., Chicago.  
 New Era Spring and Specialty Co., Grand Rapids, Mich.

## AIR COMPRESSORS

Au-to Compressor Co., Wilmington, Ohio.  
 Brunner Mfg. Co., Utica, N. Y.  
 Champion Pneumatic Machinery Co., 1402 S. Michigan Ave., Chicago.  
 Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.  
 General Utility Co., 1324 Ogden St., Philadelphia, Pa.  
 Globe Mfg. Co., Battle Creek, Mich.  
 U. S. Air Compressor Co., 5308 Harvard Ave., Cleveland, O.

## APRONS

Bailey-Drake Co., 1120 So. Michigan Ave., Chicago.

## AUXILIARY STEERING EQUIPMENT

Casco Mfg. Co., Thomasville, Ga.  
 Meixell Co., Indianapolis, Ind.

## AXLES (EMERGENCY)

Green Engineering Co., Dayton, Ohio.  
 H. G. Faro Co., 1410 S. Michigan Ave., Chicago.

## BALL AND ROLLER BEARINGS

Graham Roller Bearing Co., Coudersport, Pa.  
 The Norma Company of America, 1790 Broadway, New York City.

## BATTERY RECTIFIERS

Kentucky Electrical Co., Inc., Owensboro, Ky.

## BODIES

New England Mills Co., 1027 W. Van Buren St., Chicago.

## BODY CLEANERS AND POLISHES

Davies-Young Soap Co., Dayton, Ohio.

## BOOKS

H. E. Phillips & Co., Union City, Ind.

## BUMPERS

New Era Spring & Specialty Co., 1152 Hamilton Ave., Grand Rapids, Mich.

## CABINETS

American Bolt & Screw Case Co., Dayton, Ohio.

## CARBURETORS

Marvel Carburetor Co., Flint, Mich.

## CASH REGISTERS

National Cash Register Co., Dayton, O.

## CLEANSERS

States Chemical Co., 680 W. Austin Ave., Chicago.

## CONNECTING RODS

Au-to Compressor Co., Wilmington, Ohio.  
 Green Engineering Co., Dayton, Ohio.

## COVERS

Kennedy Car Liner & Bag Co., Shelbyville, Ind.

## CRANK CASE SUPPORTS

C. R. Backus, Mystic, Conn.

## CREEPERS (For Repair Shops)

Foster Bros. Mfg. Co., Utica, N. Y.

## CYLINDER REBORING AND EQUIPMENT

Butler Mfg. Co., Indianapolis, Ind.  
 Green Engineering Co., Dayton, Ohio.  
 Marvel Machinery Co., Minneapolis, Minn.  
 St. Paul Auto Cylinder Grinding Co., 1152 Rice St., St. Paul, Minn.  
 Storm Mfg. Co., Minneapolis, Minn.

## CYLINDER GAUGES

Am-pé-co Sales Co., Marshalltown, Iowa.

## ENGINES

Auto Engine Wks., St. Paul.

## ENGINE CLEANERS

Wagner Specialty Co., 1902 Broadway, New York.

## FAN BELTS

Premier Motor Products Co., 3945 No. Robey St., Chicago.

## FAN BELT GUIDES

Casco Mfg. Co., Thomasville, Ga.

## FIRE FIGHTING EQUIPMENT

Flexlume Sign Co., Niagara St., Buffalo, N. Y.

## FORD COILBOX PROTECTOR

Casco Mfg. Co., Thomasville, Ga.

## FORD NECESSITIES

Automotive Material Co., 208 North Wabash Ave., Chicago, Ill.

## GARAGE EQUIPMENT

Atlas Mfg. Co., 902 N. Canal St., Pittsburgh, Pa.  
 Becker Bros., 23-25 N. Jefferson St., Chicago, Ill.  
 Beckley-Ralston Co., 1801 S. Michigan Ave., Chicago, Ill.  
 Eclipse Valve Grinder Co., Dept. C., 20th St. at Oak, Kansas City, Mo.  
 Fairbanks Co., New York City.  
 W. M. Finch & Co., Detroit, Mich.  
 General Utility Co., 1324 Ogden St., Philadelphia, Pa.  
 E. C. Harner Mfg. Co., Benton Harbor, Mich.  
 B. E. Hicken Sod-Tor-Lite Co., Box 490, Prairie Hill, Mo.  
 The Imperial Brass Mfg. Co., 1224 W. Harrison St., Chicago, Ill.  
 H. G. Faro Co., 1410 So. Michigan Ave., Chicago.  
 Marvel Machinery Co., Minneapolis, Minn.  
 Romort Mfg. Co., Oakfield, Wis.  
 St. Paul Welding & Mfg. Co., 172 West Third St., St. Paul, Minn.  
 Sawyer-Weber Tool Mfg. Co., 356 S. Alameda St., Los Angeles, Cal.  
 Storm Mfg. Co., Minneapolis, Minn.  
 Testall Elect. Mfg. Co., San Antonio, Texas.  
 Zinke Co., The, 1323 So. Michigan Ave., Chicago.

## GASOLINE PUMPS AND TANKS

General Utility Co., 1324 Ogden St., Philadelphia.  
 Milwaukee Tank Works, Milwaukee, Wis.  
 Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.

## GASOLINE PURIFIER

Automotive Material Co., 208 North Wabash Ave., Chicago, Ill.  
 Universal Gasoline Purifier Co., 258 Main St., Buffalo, N. Y.

## GEARS

William Ganschow Co., 1002 W. Washington St., Chicago.

## GEAR AND WHEEL PULLERS

Premier Motor Products Co., 3945 No. Robey St., Chicago.

## GREASE GUNS

Frank Rose Mfg. Co., Hastings, Neb.  
 H. G. Faro Co., 1410 So. Michigan Ave., Chicago.

## HYDRAULIC PRESSES

Lourie Mfg. Co., Springfield, Ill.

## LENSES

C. A. Shaler Co., 372 Fourth St., Waupun, Wisconsin.

## MOTOR CARS

Elgin Motor Car Corp., Argo, Ill. (Suburb of Chicago.)

## OILS AND LUBRICANTS

National Refining Co., 2003 Rose Bldg., Cleveland, Ohio.

## OIL DRAIN COCKS

Casco Mfg. Co., Thomasville, Ga.

## OIL PUMPS AND TANKS

General Utility Co., 1324 Ogden St., Philadelphia, Pa.  
 Milwaukee Tank Works, Milwaukee, Wis.  
 Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.

## PISTONS

Am-pé-co Sales Co., Marshalltown, Iowa.  
 Green Engineering Co., Dayton, Ohio.

## PISTON RINGS

Bailey-Drake Co., Inc. (Sales Dept. for Trione Piston Ring Co.), 1120 S. Michigan Ave., Chicago.  
 Burd High Compression Ring Co., Rockford, Ill.  
 Butler Mfg. Co., Indianapolis, Ind.  
 Ever-Tight Piston Ring Co., 1609 Kingsland Ave., St. Louis.  
 General Utility Co., 1324 Ogden St., Philadelphia, Pa.  
 Green Engineering Co., Dayton, Ohio.  
 No Leak-O Piston Ring Co., Baltimore, Md.  
 Ponderick Bros., Leavitt St. and Jackson Blvd., Chicago.  
 Steel Spring Piston Ring Co., 145 Metropolitan Ave., Brooklyn, N. Y.

## PUMPS

Air-Tight Steel Tank Co., Pittsburgh, Pa.  
 Frank Rose Mfg. Co., Hastings, Neb.  
 Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.  
 Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

## SCHOOLS OF MOTORING

Greer College of Motoring, 1519 So. Wabash Ave., Chicago.

## SHOCK ABSORBERS

Philip H. Webber & Co., Heoperton, Ill. (W. & C.)

## SIGNS

Federal Electric Co., Lake & Desplaines Sts., Chicago.  
 Flexlume Sign Co., Niagara St., Buffalo, N. Y.

## SOLDERING FLUX

M. W. Dutton Company, Providence, R. I.

## SPARK PLUG INTENSIFIERS

Universal Mfg. & Sales Co., 552 W. Harrison St., Chicago.  
 All Spark Ignition Co., 13 Water St., New York.

## SPRINGS

Garden City Spring Works, 2000 Archer Ave., Chicago.  
 Harvey Spring & Forging Co., Racine, Wis.  
 Jenkins Vulcan Spring Co., 1403 Chestnut St., St. Louis.  
 New Era Spring and Specialty Co., Grand Rapids, Mich.

## STEERING WHEELS

Au-to Compressor Co., Wilmington, Ohio.

## TESTING INSTRUMENTS

H. E. Phillips & Co., Union City, Ind.  
 Weston Electrical Instrument Company, Newark, N. J.

## TIMER

J. W. Duntley, 1011 Michigan Ave., Chicago, Ill.

## TIMING DEVICES

Baird Equipment Co., 324 W. Ohio St., Chicago.

## TIRES

Brunswick-Balke-Collender Co., 623-633 S. Wabash Ave., Chicago, Ill.  
 Leo McDaniel Rubber Co., Cairo, Ill.

## TIRE PROTECTORS

Coffield Tire Protector Co., 31 Court St., Dayton, Ohio.

## TIRE PRESSURE REGULATORS

Automatic Safety Tire Valve Co., 1753-1755 Broadway, New York City.

## TIRE REPAIR EQUIPMENT

Atlas Auto Supply Co., 680 W. Austin Ave., Chicago, Ill.  
 B. F. Goodrich Rubber Co., Akron, Ohio.  
 Zinke Co., 1323 So. Michigan Ave., Chicago.

## TIRE RENEWING AND EQUIPMENT

Leo McDaniel Rubber Co., 304 Commercial Ave., Cairo, Ill.

## VALVES

Romort Mfg. Co., Oakfield, Wis.  
 A. Schrader's Son, Inc., 783-798 Atlantic Ave., Brooklyn, N. Y. (Automatic Inflating Valve)

## VULCANIZERS

C. A. Shaler Co., 353 Fourth St., Waupun, Wis.  
 Wood-Craft Co., 1485 Marshall Ave., St. Paul, Minn.

## WELDING AND EQUIPMENT

The Imperial Brass Mfg. Co., 1224 W. Harrison St., Chicago, Ill.  
 Frank Chas. Owens, 19 No. Morgan St., Chicago.  
 St. Paul Welding & Mfg. Co., 172 W. Third St., St. Paul, Minn.

## WIRE AND TERMINAL GUARDS

J. W. Duntley, 1011 Michigan Ave., Chicago, Ill.

## WRECKING TRUCKS

Robt. Holmes & Bro., Danville, Ill.

## WRENCHES

Au-to Compressor Co., Wilmington, Ohio.  
 The Graham Roller Bearing Co., Coudersport, Pa.

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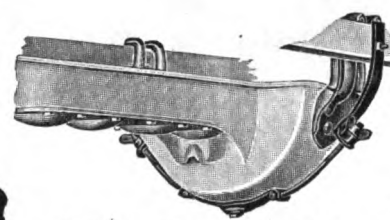
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Patented Sept. 11, 1917

## The JOHNSON Crank Case Support

"The most essential equipment for Ford Car or Truck"

PREVENTS

Breaking of Crank Case Arms  
 Loose Crank Case Arms  
 Oil Leaks Vibration

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LABELED BY THE UNDERWRITERS LABORATORIES

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SPECIAL PROPOSITIONS TO JOBBERS

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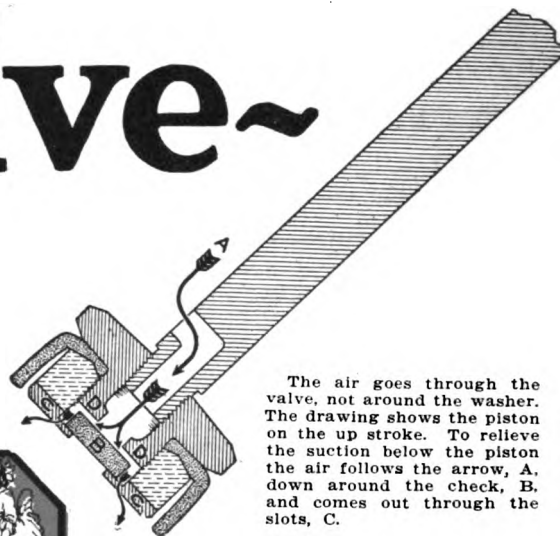
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# This Valve~

Took the Back Ache  
Out of Tire Pumping  
and Sold 2,500,000

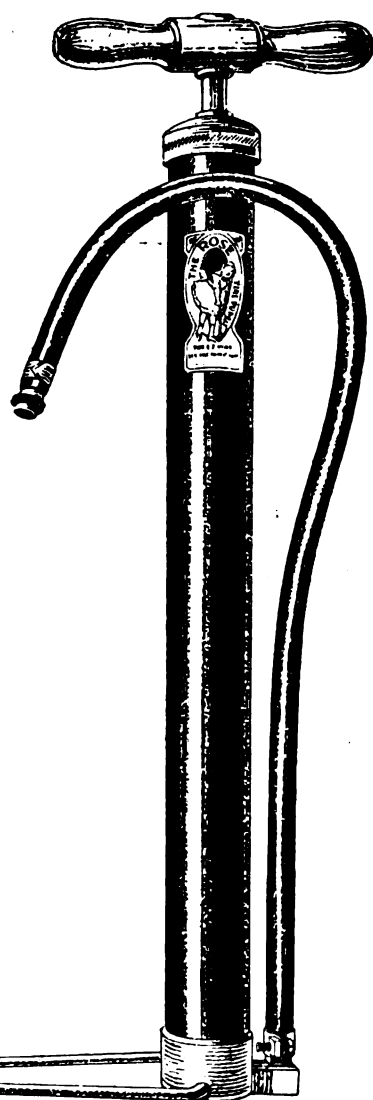
# ROSE



The air goes through the valve, not around the washer. The drawing shows the piston on the up stroke. To relieve the suction below the piston the air follows the arrow, A, down around the check, B, and comes out through the slots, C.

On the down stroke the check, B, presses up against the shoulders, D, making air leakage impossible. Compression begins the instant the piston starts down.

## Tire Pumps



There is one big reason why Rose Tire Pumps lead the field—that is the Rose Patent Valve. Air does not go around the washer in a Rose Pump but through the valve. There is no leakage of air on the down stroke and no suction on the up stroke. In fact, the saving of labor is so great that it is immediately noticeable. Every bit of work you put in counts for something.

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**Frank Rose Mfg. Co.**  
Hastings, Nebr.



# CHAMPION AIR COMPRESSORS

## Serve best for every purpose

THE requirements of air service vary with locality and other conditions. Whatever type of air outfit you need you will find your logical choice in the CHAMPION line. We are now manufacturing CHAMPION Air Compressors in a number of types—each of several different capacities. So we are enabled to take care of all requirements.

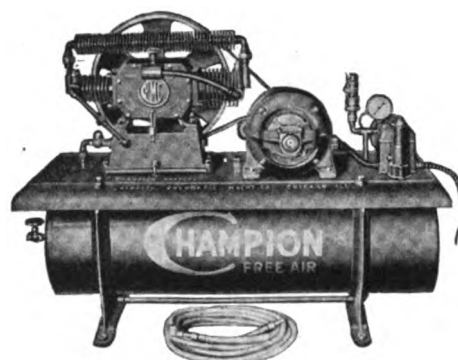
CHAMPION supremacy in the air compressor field is secured through the following features:

- (1) **CYLINDERS and VALVE HEADS** are cast integral. Cylinders are cast steel removable from crank case.
- (2) **VALVES:** Mushroom type housed in bronze cages. Special arrangement for regrinding.
- (3) **MAIN BEARINGS:** Annular ball bearing type which reduces friction and assures easy running, long life and saving of power.
- (4) **CRANK SHAFT:** High grade carbon steel, drop forged  $1\frac{1}{4}$ " in diameter.
- (5) **CONNECTING ROD BEARING:** Bronze back, lined with highest grade anti-friction babbitt metal.
- (6) **WRIST PIN:** Chrome nickel steel hollow, hardened and ground, securely fastened with set screw.
- (7) **CONNECTING ROD:** I-beam type with inserted wrist pin bushing.
- (8) **CONNECTING ROD SHIMS:** Of "laminated" brass durable and easily adjusted to take up any wear.
- (9) **LUBRICATION:** Automatic splash insures perfect lubrication.
- (10) **FLY WHEELS:** Balanced crowned fan blade type of ample size to assure perfect cooling.
- (11) **AUTOMATIC PRESSURE RELEASE:** Eliminates the cause of burned out motors, fuses, etc.

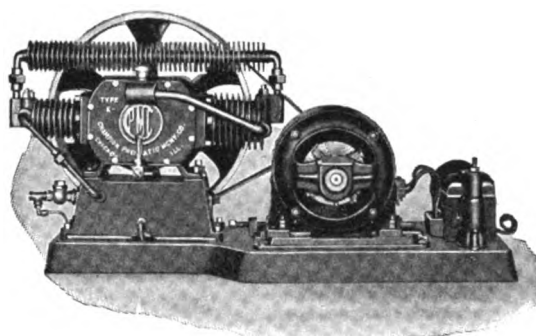
Champion Air Compressors are backed by a liberal guarantee. They are ready for prompt delivery. Write for complete information.

## CHAMPION PNEUMATIC MACHINERY COMPANY

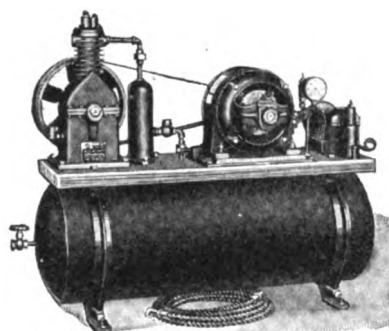
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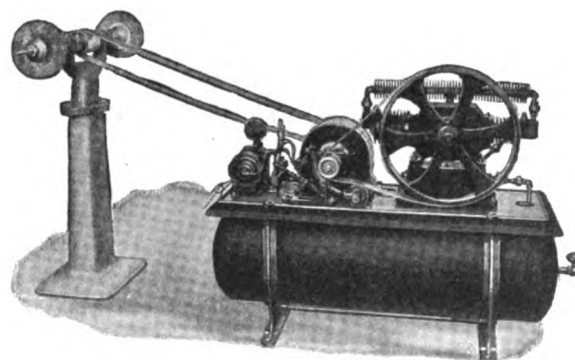
Champion Special Equipment K-113



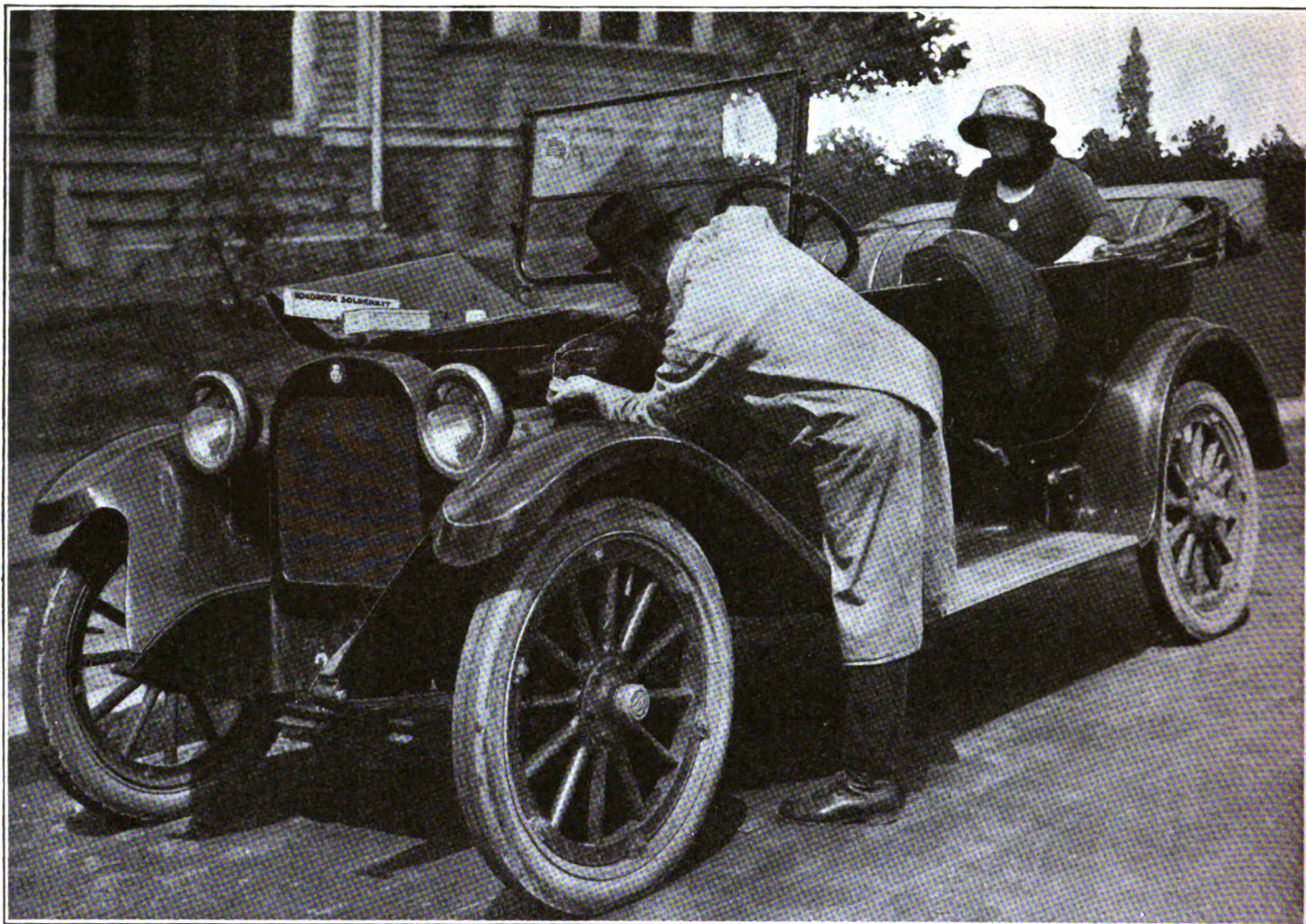
Equipment With Automatic Controller K-111



Single Stage Automatic Air Unit 8-121



Champion Combination K-115



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Every motorist should be equipped to do a small soldering job when it is needed. The timely application of a few drops of solder often prevents a breakdown, an accident, a repair job or an arrest and fine. The illustration above shows a car owner making a soldered connection on his horn. He must have this horn in working order so he can sound it at crossings as prescribed by law. He is able to make this repair quickly and securely by means of his

## NOKORODE SOLDERKIT

With this outfit the car owner can make many repairs, including leaky radiators, cracks on the body, leaks in the gas tank or its pipes, broken connections on the batteries, and other parts that require soldering.

The SOLDERKIT is a thoroughly practical outfit, containing complete instructions for soldering and the tools and materials to do the work.

*Retail Price \$1.50*

*DEALERS—Write today for our interesting proposition and trade prices.*

**THE M. W. DUNTON CO.**

PROVIDENCE, R. I., U. S. A.



# American Garage & Auto Dealer

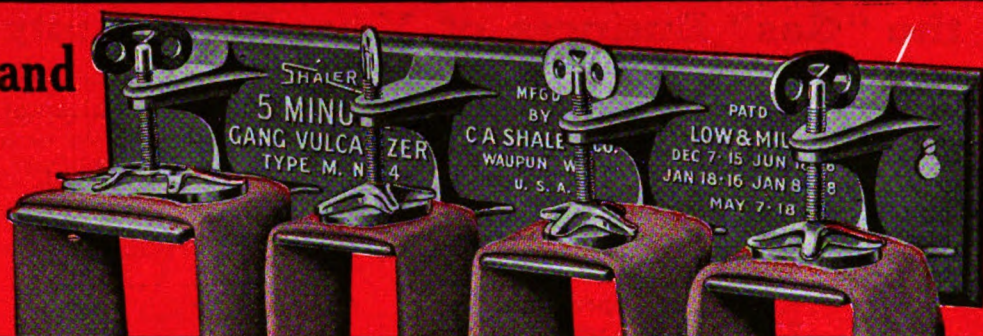
Published Monthly  
116 So. Michigan Ave.  
CHICAGO, ILL.

AUGUST 1920

Vol. 11—No. 8.  
10 Cents the Copy  
\$1.00 Per Year.

**Vulcanizer and  
28 Patches**

**\$7<sup>00</sup>**



## Vulcanize Tubes "While They Wait"

Give your customers *vulcanized* tube repairs—permanently heat-welded so they will never loosen—in the same time that it would take them to put on a temporary, troublesome cold patch—and see how quickly they will bring you more business.

With the Shaler 5-Minute Garage Tube Vulcanizer you can vulcanize four tubes in five minutes with firm, flat, vulcanized repairs that cannot be torn off without tearing the tubes themselves. This large capacity vulcanizer is safe, dependable, economical—and a business getter.

## **SHALER** Garage Vulcanizer

uses the Shaler Patch-and-Heat Units. You know how convenient these popular units are—more than ten million of them were used last year. Anybody can make perfect vulcanized tube repairs with them the first time he tries.

### Big Free Offer

With each vulcanizer we send 28 assorted Patch-and-Heat Units—that will fully pay for the vulcanizer if you charge only 25c for each repair. (You can buy additional units from your jobber at a very low price.) List price of vulcanizer and 28 patches is \$10, subject to 30% trade discount, which makes the cost to you only \$7.

**Write Quick—or Ask Your Jobber**

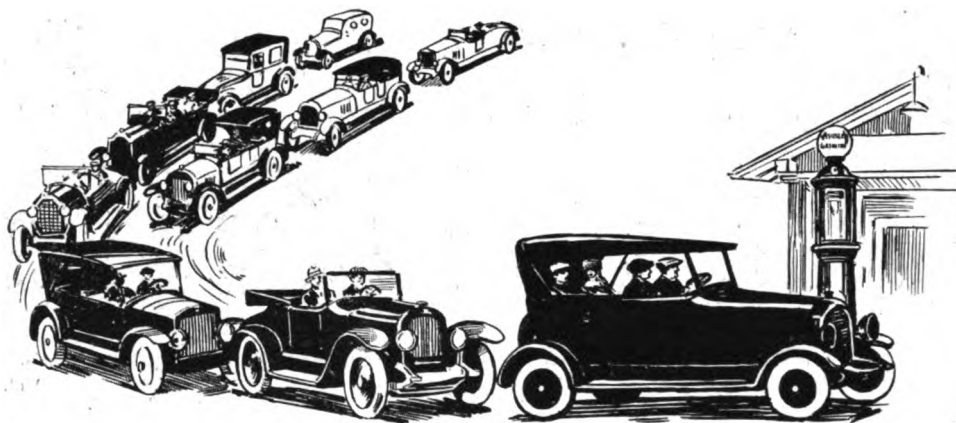
C. A. Shaler Company, 357 Fourth Street, Waupun, Wis.

ROUND  
PATCH  
1 3/4 INCH

OBLONG  
PATCH  
1 3/8 x 2 1/4 INCH

EX-LONG  
PATCH  
1 3/4 x 4 INCH





## Let a "Victory Visible" Gasoline Pump Put You in Command of the "Gas" Business of Your Community

Startling disclosures made by City Sealers and State Inspectors, coupled with published extracts from the proceedings of the United States Bureau of Standards at Washington, have stirred up the gasoline-buying public to a point where every "blind" pump, no matter how honest or popular its owner, is under suspicion.

For, all these disclosures go to show that, no matter how carefully a "blind" pump has been tested before leaving the factory, it can NOT be accurate—

1. When improperly installed
2. When parts wear
3. When the slightest particle of foreign matter becomes lodged in the valves

Honest Retailers are also made to suffer for the sins committed by crooked cut-rate competitors who find it easy to "fix" their blind pumps so that they always give short-measure.

## The "Victory Visible" Pump Can Neither Cheat Nor Be Cheated

And the public **knows** it. This is because each buyer sees his 5 gallons of gasoline, in a clear glass measure, before it is drained into his car.

**The Reed Oil Company, Atlanta, Ga.,** say—"We immediately noticed an enormous increase in our gasoline sales."

**The Wayside Service Station, Highland Park (Detroit)** say—"Our three Tokheim Visible pumps dispense more gas than any other filling station in Detroit. The combined reading of our 3 pumps to date is 571,801 gallons, two of the pumps having been operated a year and the other nine months."

**The Petroleum Oil Co., Anderson, S. C.,** say—"We have 14 Tokheim Visible Pumps in active operation and are now installing two more. They are the best advertisers and trade getters we know of."

**The Markley-Meyers Auto Co., Shelbyville, Ind.,** say—"Our Tokheim Visible Pump has delivered to date (Feb. 10, 1920), 126,284 gallons of gasoline since July 4, 1919, without a single miss. Our business has more than tripled itself from the fact that the public see what they are getting."

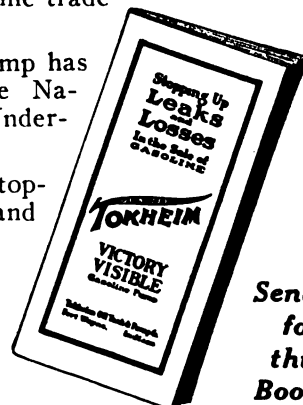
**The Perfection Oil Co., Dallas, Texas,** say—"Five Tokheim Visible Pumps have been in continuous service since July 1st, 1919, without a dollar of expense for upkeep. They have

helped us to increase our sales more than 500% in spite of most adverse weather conditions.

Get in your order now. It will be filled in sequence. Demand for Victory Visible Pumps is so great that we are already far behind our orders; but the quicker your order comes the sooner you will get your pump and become the **master** of the gasoline trade of your community.

The Victory Visible Pump has been approved by the National Board of Fire Underwriters.

Send for our Book—"Stopping up the Leaks and Losses."



Send  
for  
this  
Book

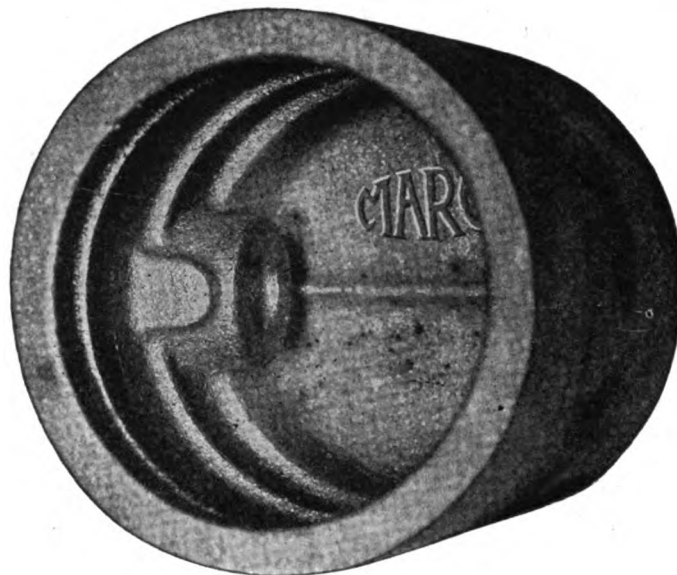
**Tokheim Oil Tank & Pump Co.**  
FORT WAYNE, INDIANA



# MARCO PISTON CASTINGS

Made of the best quality of close-grain grey iron, easy to machine and reasonably free from blow-holes and sand pits. Made light and well balanced.

Marco Piston Castings have been used for years. Nothing freakish or experimental. Sane, sound and practical. Made of the same material as the cylinder block. The expansion of the block and the piston are equal, preventing piston flap, excessive use of oil and noisy motors.



An Interior View of a Marco

## FROM PIGS TO PISTONS

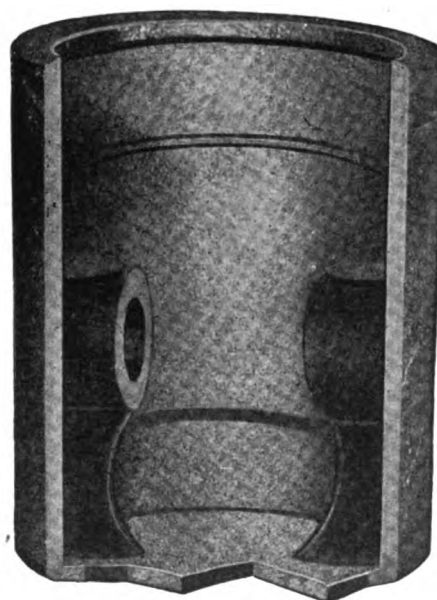


Any Size and Any Style

The different elements entering into the construction of Marco Piston Castings from pig iron to finished product are all tested by our chemists and are made in accordance with the specifications of the Society of Automotive Engineers. Every charge in the cupola is alike, being chemically analyzed daily. Castings furnished standard or over

size to .062. We have patterns for 2500 makes and models of internal combustion engines. We guarantee our castings to the extent of replacing defective castings returned to us charges prepaid.

We will be glad to enter into correspondence with manufacturers and others interested in Piston Castings and who desire to finish their own Pistons. Give us complete information regarding your requirements.



A Cross Section View of a Marco Showing Simplicity and Strength



The sign of a perfect piston

### MARVEL MACHINERY COMPANY

510 Loan & Trust Building  
Minneapolis, Minn.



The sign of a perfect piston



# "NORMA" PRECISION BALL BEARINGS (PATENTED)

There is but one true measure of value, viz., the capacity for service. It is a recognition of this fact by responsible manufacturers which has made "NORMA" Bearings the standards in the high-grade magnetos and lighting generators internationally identified with cars, trucks, tractors and power boats of the better class.

See that your electrical apparatus is "NORMA" equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# American Garage & Auto Dealer

Published Monthly

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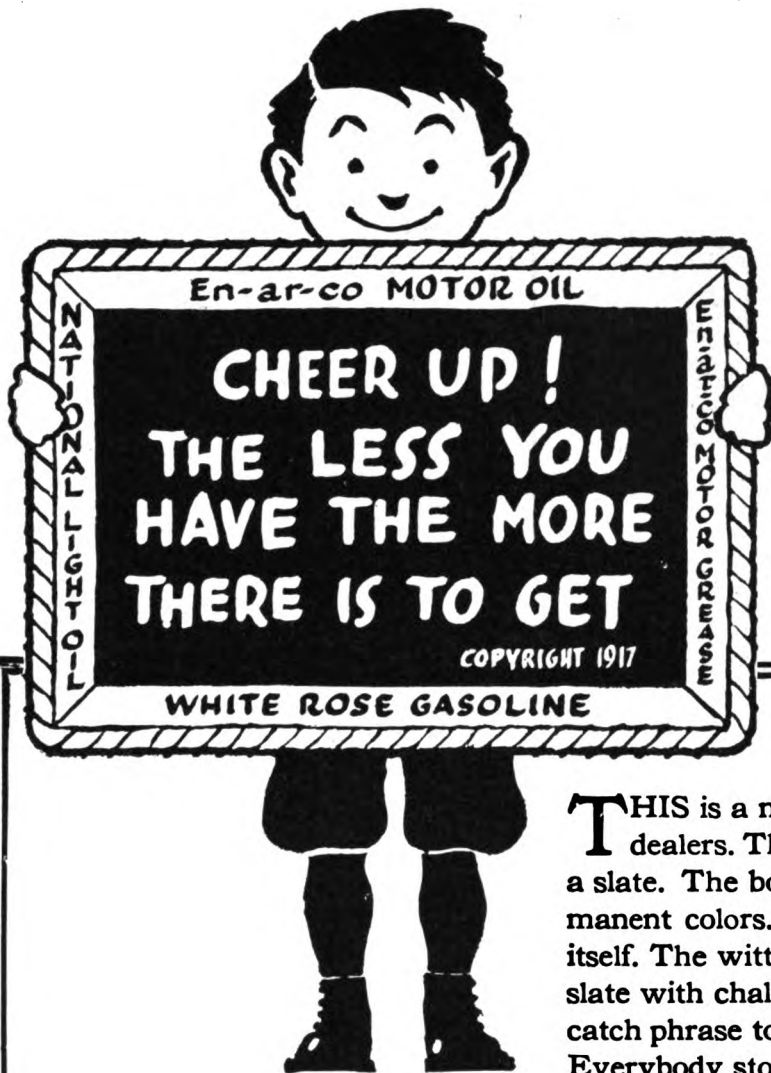
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R. S. CLISSOLD, *Vice President*      S. R. EDWARDS, *Secretary*

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## The New *En-ar-co* PETROLEUM PRODUCTS

### Boy and Slate Signs

Make People Stop  
and Read

**T**HIS is a new service we offer to EN-AR-CO dealers. The big, larger than life-size boy, holds a slate. The boy and the slate are painted in permanent colors. The sign is made to stand up by itself. The witty, amusing quips are written on the slate with chalk. We furnish you a new slogan or catch phrase to chalk on the slate every two days. Everybody stops and reads them.

## A catchy novelty that has made a big hit

The Boy and Slate sign is a cut-out board. It stands six feet high, with a writing surface on the slate three feet high by five feet wide. The sign is painted with several coats of good paint, making it weatherproof. The colors used are black, red, pink and white. The signs are strongly made of good lumber, firmly fastened with corrugated nails. The black-board of the slate is finished in such a manner as to make the use of ordinary chalk or whiting paint entirely practical.

With this sign we furnish EN-AR-CO dealers monthly with new, original witty sayings to be chalked on the slate. Enough to use a new one every other day.

This is the catchiest advertising novelty presented in many years. People can't get by these signs without stopping to read the latest funny saying. It is the best advertising EN-AR-CO dealers have ever had offered them. It sells EN-AR-CO products. The newspapers in towns where these signs have been displayed have

praised them highly for their originality. Many newspapers have published collections of these clever sayings.

Write us for dealer proposition on the EN-AR-CO Boy and Slate Sign, as well as other unique EN-AR-CO advertising features.

The National Refining Company never allows public interest to lag in its products, EN-AR-CO motor oils, EN-AR-CO Motor Grease, National Light Oil and White Rose Gasoline. EN-AR-CO advertisements are appearing in 30 of the leading farm papers and magazines.

If you are not an EN-AR-CO dealer write to us and let us explain our proposition to dealers and how we co-operate with them to create sales. Do it today.

**The  
National  
Refining  
Company,  
2126 Rose Bldg.,  
Cleveland, O.**

Please send me full detailed information as to your dealer plan and advertising helps.

Name .....

Address .....

City ..... State .....

I now sell ..... oil.

**THE NATIONAL REFINING COMPANY**  
2126 Rose Building, Cleveland, Ohio



DE LAVAL ACME QUALITY PAINTS & FINISHES

RACINE JOHNSON'S car Savers

GATES TIRES

DISSTON

Tarvia

DEARBORN "Exide"

CHASSLER

Goodrich

Barrett

DELCO-LIGHT

GOULDS PUMPS

Cletrac TANK TYPE TRACTOR

SO-BOS-SO KILFLY

CASE

FLORENCE

SHELDON Concrete Mixer

PERFECTION

Willys KNIIGHT

AJAX

Firestone

VACUUM CUP

WINCHESTER

ATKINS

FEDERAL

Columbia Six

PAPEC

ACTNA EXPLOSIVES

INDIAN ALL-ROUND TRACTOR

NEW IDEA

Apollo Roofing Products

Certain-teed

Lucas Paints

Miller Tires

MOLINE

GOOD YEAR

CHICAGO PHILADELPHIA NEW YORK

**The Farm Journal**

Sells Most Goods Because Read by Most Farmers

Among the best farmers in your neighborhood, The Farm Journal is the all-the-year-round sales booster for the standard merchandise in your stock.

The biggest farm paper in America, the widest read, the longest kept, the most influential—the paper that sells most goods in your own neighborhood, for you!

If "advertising" is to help you sell goods, the publications must be read by the people you sell. Check up with your Postmaster and compare the circulation of general magazines and farm papers in your community. And be sure to ask us how many folks in your vicinity read The Farm Journal.

TRADE MARK REG. U.S. PAT. OFF.

"Unlike any other paper"

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



# THE NEW IMPROVED Master Hydrometer

## Note This Test

The photo reproduction below shows an actual test of a Master Celluloid Ring Guide Hydrometer float and an ordinary float under identically the same conditions. Notice that the MASTER float rides freely making an accurate test possible, while the ordinary float sticks to the sides of the glass tube. The float does not come to the surface properly, consequently it cannot register correctly.

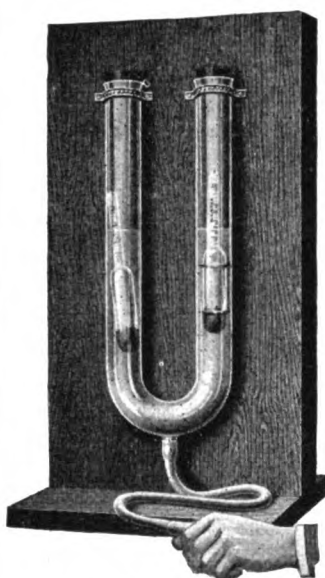


**The Battery Guard**

## Why the MASTER is Best

See illustration. Note how the studded celluloid rings on the float keep the tip from sticking to the tube. See how the solution is permitted to flow past the float between the four studs on each ring—making it possible to secure an instant, accurate reading, practically impossible with old style instruments.

## Garages, Auto Accessories, Stores, Service Stations, Repair Shops



It doesn't take long to prove to the car owner that he needs the MASTER Hydrometer. You, yourself, know that 90% of battery troubles and expenses are due to neglect that the owner can prevent or reduce if he has the means.

Get this MASTER Hydrometer for your trade. With it, any owner can make readings that are positively accurate—for, the MASTER is a real "Battery Guard."

There is a generous cash profit on each one for you and a much larger profit in the goodwill of your customer who buys one. The MASTER Hydrometers sell at a price that will easily compete with any other hydrometer on the market.

## The MASTER is BEST Because

In the Master Hydrometer, the studded celluloid rings on the float (see illustration) keep the tip from sticking to the side of the tube and makes accurate reading possible. The acid flows past the float between 4 studs on each ring just as rapidly as in the old style instruments.

### Dealers

Write us today. We handle the largest accessory line in the world. The Hydrometer is just one of thousands of excellent products we sell. Each one guaranteed in every way, and allowing a just and equitable profit to the dealer. Send the coupon and secure our large general catalog.

### Car Owners

You need a MASTER Hydrometer. Insist on getting it. If, for any reason, your dealer is not supplied send us his name and we'll see that your wants are taken care of. Write us now—you will obtain preferred service if you do.

## The Beckley-Ralston Co.

1801 Michigan Ave., CHICAGO, U. S. A.

New York Detroit San Francisco Pittsburgh Kansas City



Send coupon  
for Catalog of  
Automotive Ac-  
cessories and  
Discounts.

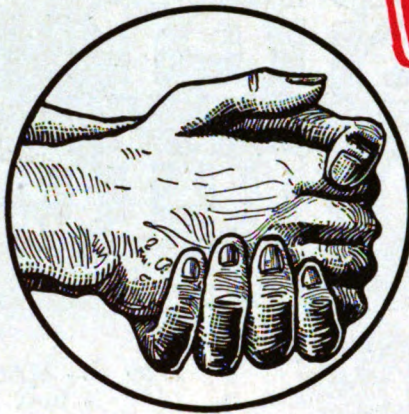
The  
Beckley-  
Ralston Co.  
Department Y.  
1801 Michigan Ave.,  
Chicago, Ill., U. S. A.

Send at once prices,  
discounts and full infor-  
mation regarding the Master  
Hydrometer. Also send us  
your latest catalog and discount  
list of Automobile Accessories.

Name .....

Address.....





THE FAMOUS  
ROADSIDE WASH

# SPEE-DEE

## Cleans greasy, grimy hands

with or without water—and never harms or irritates the skin. Think what this means to every man who works on a motor car, especially in cold weather. SPEE-DEE has an essential place in every garage, and is invaluable to the car owner. When the driver has to stop and make some repair or adjustment that involves soiling his hands, there

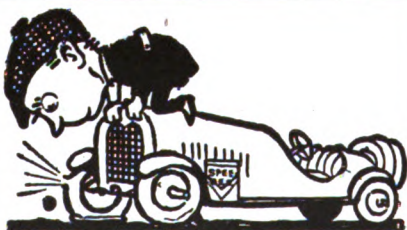
is nothing like SPEE-DEE for removing the grime. SPEE-DEE is equally effective in cleaning tops, seat covers, celluloid curtains and running gear. Give your customers a personal demonstration of the efficacy of SPEE-DEE. An Elgin dealer recently sold 50 cans of SPEE-DEE in an afternoon by showing what it would do.

Write for full particulars

MANUFACTURERS

**States Chemical Company**

680 W. Austin Avenue  
Chicago - Illinois



### For Dirty Hands in Dry Territory

You don't need water. SPEE-DEE cleans without it. Makes the hands clean and smooth or removes all spots from the clothing. No lye, grit or acid to irritate the skin. Cleans everything without harm to finish or fabric.



### Good-Bye, Dirt!

The dirt and grease fly when you use SPEE-DEE either with or without water. Makes the side curtains or seat covers look like new without injuring the fabric. Cleans walls or woodwork. A creamy cleanser that contains no lye, acid or grit to irritate the skin.



# American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,  
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol XI. No. 8

CHICAGO

August, 1920

## Motor Trucks—A Farm Necessity.

The United States Department of Agriculture has recently conducted an investigation directed at 753 farm owners of motor trucks. The question foremost in each case was: "What do you find to be the greatest advantage of owning a motor truck?"

Of the 753 farm owners who were asked this question, 91 per cent said "saving time." It is the consensus of opinion among these men that the profits accruing from the saving in time more than overbalances any extra expense entailed by the use of the motor truck.

"It is significant that the majority of these farmers are located a considerable distance from market," says a department specialist in farm labor, "more than four-fifths of them being five miles or more from their shipping points. The saving in time effected by their use of trucks is naturally greater than it would be on the average farm, which lies nearer to market than do most of the farms concerned in this investigation."

Among the important facts revealed by the investigation, the following may be mentioned:

Only 18 per cent of these farms are less than five miles from market and nearly one-fourth of them are 20 miles or more from market.

Ninety-five per cent of the farmers believe that their trucks will turn out to be profitable investments.

One-ton trucks are preferred to any other size. About half of the owners

of  $\frac{1}{2}$  and  $\frac{3}{4}$ -ton trucks prefer sizes larger than they now own.

It is highly interesting to note that about 80 per cent of these farmers state that their trucks decrease their hired help expense noticeably. The average estimate of this saving amounts to \$324 per year.

Over half of the 205 truck owners,

When you would make sales let the customer do a good deal of the talking. Be ready, however, to present your own side of the case at the psychological moment, but do it in as FEW WORDS as you can. Don't use any round-about arguments, involved sentences, and big words. Short sentences, clear ideas and faith in your own proposition, will convince. REMEMBER, COMPRESSION GIVES POWER; EXPANSION DISSIPATES POWER.

whose farms contain more than 120 crop acres, own tractors.

The average life of the trucks is estimated at between  $6\frac{1}{2}$  and 7 years, depreciation being in most cases the largest single item of expense in connection with their operation. Cost of operation of the  $\frac{1}{2}$ -ton trucks averaged about 8 cents per mile; of the  $\frac{3}{4}$ -ton trucks, 13 cents; of the 1-ton, about 12 cents; of  $1\frac{1}{4}$  and  $1\frac{1}{2}$ -ton, about 19 cents; and of the 2-ton, about 20 cents.

The average cost of hauling crops, taking into consideration the value of the driver's time at 50 cents an hour, ranged from 50 cents per ton-mile

with the  $\frac{1}{2}$ -ton trucks, down to 18 cents with the 2-ton trucks in about the same proportion as the foregoing.

In the opinions of these men the principal disadvantage of a motor truck is "poor roads." There are about eight weeks during the year when the roads are in such condition, on account of mud, snow, etc., that these trucks can not be used. The roads in which three-fourths of them usually travel are all or part dirt.

On the majority of the farms, all the hauling other than road hauling is done with horses and wagons. As compared with horses and wagons, the trucks save from one-half to two-thirds of the time required for hauling materials to and from the farms covered by the investigation.

It is safe to say that the remarkably successful developments of the motor-truck activities on the farm, as shown by this investigation, insure the truck a permanent place.

## An Economic Asset.

The Associated Advertising Clubs of the World at their convention in June in Indianapolis declared that passenger cars are an indispensable asset to modern business. That is the appeal to be used in merchandising them, for it was shown that the important sales of today are to the farmer, the doctor, the salesman, and others using the automobile for economical transportation in business.

"We've talked in our copy about 'class,' leisure, and recreation, which

was in keeping with the early days of the business, and still has a limited legitimate appeal," said John C. Long of the National Automobile Chamber of Commerce, in speaking about the merchandising possibilities of the passenger car.

"But productivity is the new watchword," he continued. "The business which can show its value to the community is the business which will prosper. Let us get in step with the spirit and needs of the nation, and merchandise the passenger car to buyers who will use it as an economic asset."

Newspapers all over the country, since the recent talk about curtailment of credit to the automobile industry, have been pointing out the commercial importance of the automobile. Any dealer or garageman can without difficulty prove that the cars in his neighborhood are most essential to the community's commercial welfare.

#### Small Investments and Profits.

Did you ever stop to think that it is possible for a dealer with an investment of \$5,000 to make more money from his business than a dealer who has an investment of \$10,000?

Suppose Smith invests \$5,000 in a certain line. He determines from the start to keep such an accurate record of every transaction that he can tell at the end of the day which lines are selling the best and which are not—information that every dealer should have no matter how small or how large his business may be.

With this knowledge readily available, he buys accordingly—eliminates slow-moving stock and pushes the sales stock that is in the most demand. He keeps this up all through the year and on December 31 finds that he has turned his stock over ten times with an average of \$1,000 net profit on each turn—a clean-up of \$10,000.

"Fine," you say. Yes, it is. But Smith couldn't have done it, if he hadn't kept the right kind of records.

But how about the other dealer?

We will call him Jones for short. He has \$10,000 worth of stock, is easy-going, and does not watch his sales as he should. His shelves always are cluttered with merchandise that no one wants, and at no time is he able to tell how he stands.

In spite of all he can do, he turns his stock but three times a year with an average profit of \$1,000 at each turn, or a clean-up of only \$3,000. Furthermore, he is slow pay and sold principally on a cash basis. What a contrast with that \$5,000-man Smith, who pays promptly at the end of 30 days and can get any reasonable amount of credit.

Which of these two dealers is going to be in business the longer—Smith with his \$5,000 or Jones with his

---

#### BUSINESS SUCCESS.

**"Aim for the highest, never speculate; never endorse beyond your surplus cash fund; make the firm's interest yours; concentrate; put all your eggs in one basket and watch that basket; expenditures always within revenue; lastly do not be impatient, for, as Emerson says, 'no one can cheat you out of ultimate success but yourselves.'"**—Andrew Carnegie.

---

\$10,000? Judging from the amount of his investment, you might think Jones would, but he will not—unless he mends his ways.

Where is there a better illustration of what quick turnovers will do than the banana man? He starts the day with a stock investment of only \$20. Before the sun goes down, his cart is empty. He has sold out, making one complete stock turnover, with a net profit of \$4. He keeps this up for 365 days, Sundays included, making a clean-up of \$1,460.

Suppose it were possible for Smith or Jones to make even half as many turnovers. Imagine what their profits would be. Such a thing would be impossible, of course, but the illustrations here recorded are sufficient to prove that a dealer with a small investment very often is able to make

more profit than the dealer with a large investment, providing, of course, that he knows his stock sufficiently well to make the maximum number of turnovers.

These will vary according to the lines that are sold, but no matter what his investment may be, the dealer must have accurate records before he can know his stock sufficiently to get the greatest number of profits out of it.

---

#### Use Road Signs.

"Why don't you put some signs out along the country roads around here?" asked the motorist of the local garageman.

"Why should I?" was the answer. "I have the only garage in town, and everyone here knows it."

"That's just the point," responded the traveler. "Everyone in town knows about your garage, but how about me? I live a couple hundred miles from here. This is the first time I have motored through here and I did not know whether or not there was a garage here until I got into town."

Then the motorist pointed out to the local garageman that signs along the road leading into town could be made to produce business. The traveler, seeing signs, "Our Town Garage—9 Miles—Gasolene, Oil, Tires and a Complete Line of Accessories," will plan to go on to the "Our Town Garage."

Accessories can be sold which would not otherwise be disposed of, for, when a motorist is traveling, he is more likely to purchase what might be termed essential accessories, particularly when his attention is specifically directed to them; also he is, in case of trouble, quite likely to telephone from the nearest farmhouse when he knows help is close by, rather than tinker with it himself.

The arguments presented by the motorist to the local garageman were set forth so convincingly that he had to admit his viewpoint was wrong and that road signs would be an aid to increasing his business.



# Up From a "Shoestring" to Success

How a \$60,000 Garage and Automobile Business Was Built Up by a Man Who Had Not Enough Money to Pay for His First Car—This Was Accomplished in a Town of 1,700 Population—A Story of Honest Business Strategy

By K. H. Lansing

Starting fresh from the farm in 1911, as he says, "on a shoestring," with not enough money to pay for his first car, Howard Height, the leading garageman and automobile dealer in the borough of Manasquan, New Jersey, valued his stock of cars and other property at his most recent inventory, at \$60,000.

When it is taken into consideration that Height has been able to accumulate this desirable competence in a place that even now does not exceed 1,700 inhabitants, and all this while has played a lone hand in building up his business, except that he has had reliable and competent employes, it is realized that the conduct of his business has been most exemplary for the small-town garageman and dealer.

Height has the agency for Ford passenger cars and trucks in his restricted territory. He is not even a distributor. But he has proceeded steadily and with due caution, has steered clear of financial crashes and yet he has had the courage to take a chance when that chance looked good to him.

As he says: "I got under way at the right time, in the right way, and apparently I was the right fellow to do it. Another chap at another time, working in another way, might have

mussed things up one way or another."

True, but any garageman in a small town, or even village, can learn a valuable lesson just by following the steps of Height's business career, though in more or less rough outline.

Before entering into details of Height's progress, it might be well to state what sort of a business he now has, in addition to his Ford agency.

He is agent for Exide batteries and does a good battery-charging business, having a department therefor.

He does a large body-painting business.

He has an extensive used car trade.

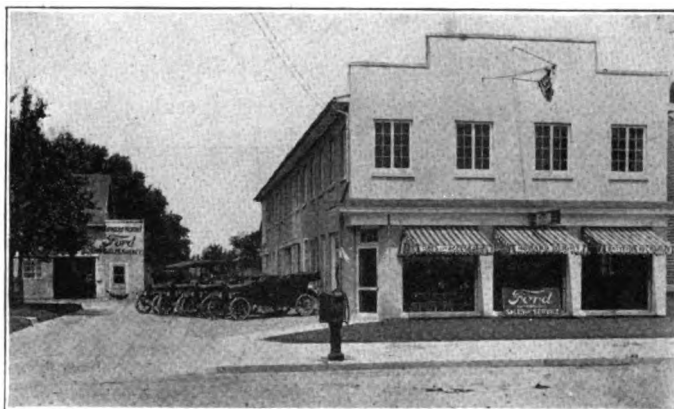
He does a profitable business in hiring to the local undertakers, a motor hearse and a casket car which he owns, as well as hiring to them automobiles for funerals.

He gets most of the wrecking jobs which happen in the borough, not because, like many city garagemen, he "goes after" them, but because he has the only suitable outfit therefor, in the way of a properly equipped service car—yes, it's a Ford, too.

It may be surprising to add that Height does not do a storage business, in the garage sense—he hasn't any room for it anyway, with all his other business angles, although he has three buildings and is planning to put up more in the near future.

For a while he was in the jitney business, on the side, but is out of it, anyway for the time being, as he didn't find it sufficiently profitable and there is a jitney and bus war on at present, to get the beach trade—Manasquan's sea bathing beach is quite famous. Manasquan is in Monmouth county and not very close to any large city.

Has Height any competition? Well, there are seven or eight other good-



The Sales and Service Building.

Of course, he sells parts for Ford cars, for he is catering to Ford trade.

He also sells general automotive equipment.

He is agent for Goodyear, United States and Fisk tires.

He mounts tires and vulcanizes tubes in a small way for tourists.



Howard Height's Out-of-Doors Salesroom.



Howard Height's First Garage Was a Barn.

# The Right to Workmen's Inventions

One of Sanderson's Employees Liked to "Tinker" Around the Shop Instead of Doing Regular Routine Work—In Course of His Experiments He Invented Something Worth While—Was Sanderson Entitled to an Interest in Invention?

By Chesla C. Sherlock

Jimmy Davis, one of the employees in the Sanderson garage, was one of those young fellows who loved to "tinker" and experiment. His head was full of wheels, as the expression goes.

One day Sanderson came into the shop and watched him while he tinkered around. It should be said in justification of Sanderson that he was patient and long-suffering; Jimmy was doing something aside from his regular work, and he should have been doing the job Sanderson had assigned him.

But Sanderson smiled gamely and remarked: "Someday you are either going to invent something worth while, or you are going to get fired!" Jimmy smiled, too, but he did not take the hint. He just laid down his tools and commenced to talk.

In that flow of talk there was all the fire and ambition of the dreamer, dreaming his dreams of great things. "I hate to do the work around the shop," he said, quietly, "but I like to tinker. Isn't it funny? It's working with machinery, just the same."

Sanderson nodded. "That's the trouble with most of us, Jimmy," he remarked. "We have to do a lot that we don't like in order to get to do a little that we do like."

In the course of time, Jimmy Davis did invent "something worth while." It was no secret that he kept to himself. It was all done right in the Sanderson shops during the regular hours—and on Sanderson's time. It was a new kind of carbureter that would burn several kinds of fuel without the addition or changing of a single part. Needless to say, it was an invention having great commercial value and promising immediate and large returns.

When it had been thoroughly tested and tried out and proved to be a wonderful success, Jimmy commenced to talk about patenting it. In fact, he had consulted Sanderson as to the best patent attorney to submit the plans and application to.

"How much of an interest are you

going to give me in this patent?" asked Sanderson.

"You!" exclaimed the astonished Jimmy. "Why, what right have you got to any of it? You didn't invent a single piece of mechanism in the whole carbureter!"

"That may be true," replied Sanderson, evenly. "But I made it possible for you to perfect the carbureter. During the months that you have been working on it, you have used my tools, and done the work on my time. I didn't hire you to tinker; I hired you to work in the shop. Instead of giving me value for the

**"Believe in yourself, believe in humanity, believe in the success of your undertakings. Fear nothing and no one. Love your work; hope, trust and work. Keep in touch with today. Teach yourself to be practical and up-to-date and sensible. You cannot fail."**

—Anon.

money I paid you in the shop, you soldiered on the job and perfected this invention. Now, you expect to patent it in your own name and save the fruits of it all to yourself. Do you think that is altogether fair?"

"If you didn't like what I was doing, why didn't you fire me?" was the sullen query of Jimmy.

Sanderson put his hands on the young man's shoulders. "See here, Jimmy, we are not going to have one bit of trouble about it. I let you go ahead with your tinkering because I knew that it was the one big chance of your life to get ahead. I had faith in you and I felt that you would come out on top. That's why I kept still and let you do about as you pleased. I don't want to gobble up your invention, but I just wondered what you were going to do to protect me."

Jimmy, however, had none of the unselfishness in his make-up that characterized Sanderson. Now that he had wealth and independence within his grasp, he played the "hungry

dog in the manger" and absolutely refused to concede that Sanderson had a single right to the invention.

Sanderson said nothing, but he was now to the point where his interest, if not his anger, had been aroused. He mentally determined to drop in at the Judge's office and find out what the law had to say on the subject.

When Sanderson had stated the case to the old Judge, the latter went to great pains to explain the law of the matter.

"It is very plain that the employer has a right to the inventions of the workmen in his employ," he said, "provided that the employer has expressly hired the workmen at a stipulated salary or payment for the express purpose of perfecting inventions for him.

"The employer has no natural right to the inventions of his employees. He has no exclusive right to such inventions. The law lodges that right with the actual inventor, and the employer cannot claim the invention or any interest therein unless he has expressly hired the workmen to exercise their inventive genius for him.

"In nine cases out of ten, if the workman is successful in the invention of a given appliance, even under such a contract, he will seek to retain it to himself. The courts have, in this connection, adopted a fair view of the matter and held that the employer has full rights under the contract to the invention.

"But where the invention arises casually out of the employment, as being entirely aside from any express agreement or contract for that specific purpose, such as in the case of Jimmy Davis, you would have no right to the invention.

"The only instances where an employer can acquire an interest in an invention brought forth under such circumstances, is where a specific agreement is entered into between the employer and his workman, prior to the invention granting him an interest, or a valid assignment of an interest therein after the invention is perfected."

# Tip Top Tips on Tire Service

Quick Tire Service, Inc., Down in Montgomery, Ala., by Working Down to Details in Tire Service, Has Found That Thoroughness in Large Essentials Is Successfully Accomplished — An Interesting Story Interestingly Told

By E. J. Lacy

What's in a wrench? Nothing, perhaps, for the romantic ones of business who might look for success solely through large and imaginative planning; but for a practical and thorough firm like the Quick Tire Service, Inc., Montgomery, Ala., an opportunity of bringing its system of tire aids nearer the goal of quickness and efficiency.

Its action in wrenches shows into what minute particulars this company goes in its execution of tire service. Specially constructed sets of tire-changing wrenches have been designed for the exclusive use of its service men, to facilitate speedy tire work.

Formerly these tools were made in sets of five or six, with a different sized socket at each end, to fit the rim nuts of the various makes of car, which ranged in size from 5/16ths to 13/16ths of an inch. The ten-

tendency toward standardizing car manufacture has reduced the number of different sized nuts on the 12 most used makes to four, and the new wrench set consists of two tools, with a different sized socket at either end. Decreasing the number of implements eliminates much of the time-waste formerly experienced in the selection of the appropriate tool.

Another point in favor of the new wrench is that it is one inch shorter than the standard, and is, therefore, easier to handle.

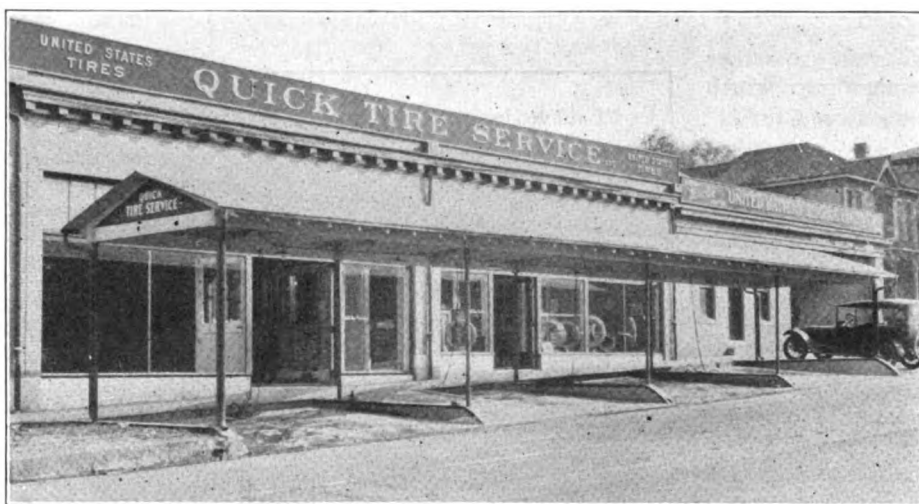
## Sum of Details—Universality of Service.

Where detail is so perfected, thoroughness in large essentials is naturally expected. Just one example will show how this motto of thoroughness is carried out in the matter of equipment.

In addition to the air facilities at

the store, each of the five road service cars carries at least one air tank, in which there is a pressure of 145 pounds. Taking the accepted measurement of 17½ pounds of pressure to an inch of tire, this supply is more than sufficient to inflate to the necessary firmness a 40x8 "Nobby Cord." (The firm distributes United States tires.)

In case a truck driver, who calls for service while on the road, needs air for more than one of his pneumatics, additional air tanks are sent.



Fully Equipped Stalls Where Car Owners May Find Shelter While Repairs Are Being Made.

As many as four tanks can be loaded on the Little Red Patrol—the name given to the small Ford service trucks—giving a sufficiently large amount of air for a complete equipment of the large pneumatics.

Universality is the rule of the policy as well as of the equipment. The company believes that the essence of an emergency service, such as road service to relieve motorists overtaken by tire troubles, is that it be available in emergencies.

Keeping open day and night, it not only gives a sense of security to its customers, but enables truck users to have their pneumatic equipment put in good condition, or their solid equipment pressed on, at night. These vehicles, in which idleness is costly, need suffer no interruption in usefulness because of their tire equipment

## Trouble Prevention, Speed, Courtesy—Service Keynotes.

Indicative of the spirit of the company is the "Service Men's Primer," to which all men who do work on customers' tires must subscribe. It reads:

### Service Men's Primer.

I WILL—

Report for work on time and keep my uniforms clean.

Examine my car the first thing in the morning and see to it that it has plenty of oil, gas and water.

Always be polite and courteous.

Wait on all customers alike regardless of the amount of tips.

\* \* \* \*

Never argue with or talk back to a customer or counterman.

Always greet a customer cheerfully and bid him goodbye in the same way.

Try to remember customers, and call each by

his name every time he calls.

Throw my cigarette away when waiting on a customer.

Always tip my cap to lady customers when they come and go.

\* \* \* \*

Keep "the boss" from calling "front" by being there before the customer stops.

Leave immediately when given a service run and go straight to my destination.

Not exceed speed limit or break traffic rules.

Not dodge in front of other cars or in any way offend motorists.

\* \* \* \*

Tell customer the exact amount of air I put in his tire.

See that all lugs are tight, and valve nuts, caps, and dust caps are replaced.

See that the chain and lock are

securely fastened on customer's spare tire.

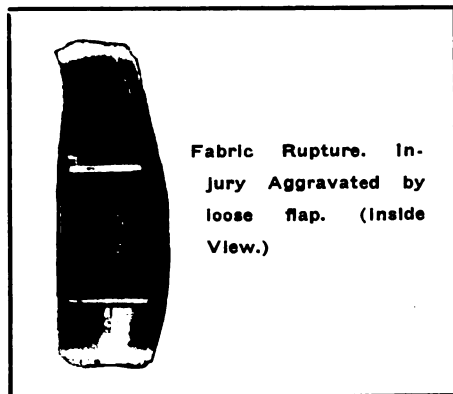
Point out to the customer all cuts and bruises in tread and advise repair.

If the run is C. O. D. and the customer objects, tell him in a polite way to call the office.

Get the full name and address when a customer hands me goods for repair.

Always put the customer's license number on service run and get his signature.

Take care of any customer who



stops me on my return and report to the counterman his name and address and what I did for him.

\* \* \* \*

Always stand behind a customer's car when it backs away from the curb and see that the street is clear.

Examine a remount with repaired tube. If repair is on inside, I will examine the flap and notify the counterman if a new one is needed. If the repair is on the outside, I will examine the case for nails and breaks and notify the counterman if a boot or repair is needed.

\* \* \* \*

Keep my car clean and well oiled, and fill tank with air and examine gas, water and oil immediately on returning from a service run, so that I am ready for the next call.

Have my air gage tested at least once a week.

Report all car trouble to the mechanic immediately.

Hang up the air hose when I am through with it.

Keep the sidewalk in front of the store clean.

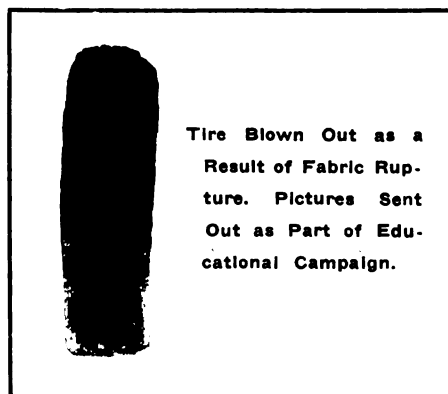
Report to "the boss" all complaints made by customers.

Throughout this set of resolutions run three themes—trouble prevention, courtesy and speed. Nor is the service man's attention confined to the wheels he equips, or solely to tires.

He examines and reports such things as rusted or crooked rims, wheels out of line, and tires that show signs of wear and may be saved further damage by a small inexpensive repair. In the examination of wheels not equipped by them, as serious an error as the absence of locking rims is sometimes found—and very grateful is the motorist to whose attention such omissions are called.

Speed counts most—although it is always an important consideration—when a customer in trouble on the road, calls in for help. A training in second-saving is given all employees connected with this work that would be a creditable showing for a fire department. The interval from the ringing of the summoning telephone until the service car starts from the garage "as swiftly as the law allows," averages about a minute and a half.

Practice in dismounting and mounting tires, enlivened by occasional contests among the service men, has reduced the time required for a change to 7½ minutes. The result to the customer is, to take a specific instance, if he has a puncture or a blow-out about a mile from the store, that he loses only 15 minutes from the time



he discovers the trouble until he is on his way again.

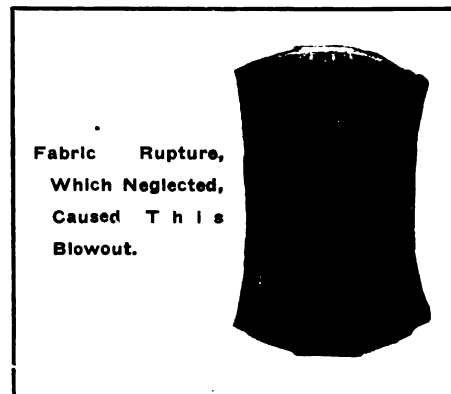
To maintain its high standard of courtesy, the Quick Tire Service, Inc., has adopted the policy of encouraging suggestions from all of its employees, including the tire changers. Most of the items in the "Service Men's Primer" originated from the service men themselves. This company has found that its men are cheerful, willing and efficient when they have once caught the idea of the dignity of service and their importance to their organization.

Even the wide range of duties connected with tire equipment does not constitute the whole usefulness of the company to the community. They are

always willing to give any information, and to take up Central's discarded duty of telling the "correct time, please."

"We never know when we pick up a ringing telephone what message is coming to us over the wire. From shoe heels to ambulance is the range of calls made on us," says D. W. Hissner, manager.

"The following is a partial tabulation of a record kept for 20 days, of calls on us for other than tire service:



Fourteen calls for assistance in hauling automobiles; 10, motor repair; 34, gas and oil delivery; one, ambulance; 11, taxicab. Demands for tire chains and other tire accessories were too frequent to enumerate.

"Calls for articles or service wholly unconnected with tires or automobiles are also frequent; and more extraordinary—for instance, the heel incident I referred to before. A young lady telephoned from a drug store, saying that she had lost the heel off her shoe, and so could not walk and she wanted one of our service cars to carry her to the shoemaker.

"Judging by the number and variety of demands, the service part of our business has become fairly familiar to the public, and awakened in them the confidence in our ability and willingness.

"Even in filling these calls, we have variety, amusement, and danger. Our store is open every hour of the 24, and many are the midnight and early morning drives taken by our service men. Our Red Patrols have gone through tremendous storms to bring tire equipment or assistance to put the unfortunate motorist in shape to fight his way to shelter. They have gone over their hubs in water, to distances of 50 miles. This department of our work has the interest and satisfaction of any work of service and rescue."



# Importance of Planning the Garage

Garage Patrons Are Well-Traveled Nowadays and They Are Observant—In Making Comparisons Between the Garages of One Town and Another, They Are Keen to Appreciate System—Is the General Plan of Your Garage Impressive?

By F. H. Sweet

If the average garageman would only realize that his patrons are fast becoming well-traveled patrons as a result of the identical convenience which makes it necessary for his particular business, and that in their travels they cannot help being observant, he would have no difficulty in seeing that his own personal interests demand that they be given the best of efficient service.

The patrons permanently resident in his territory, as well as his tourist patrons, are not slow to recognize and appreciate efficient service. It is only natural that they should find a great many opportunities for making comparisons—and comparisons are sometimes odious, even if they be made mentally.

In planning a building for a business in which the proprietor is personal head of the departments, the business office, in which much of his time will be spent while he is in the building, should form the heart of the plan—and all other departments should be so placed in relation to the location of the business office as to be within easy access of it. The ideal plan will so arrange matters that all the activities of the business will be under the eye of the proprietor—and this is not because of any fear of dishonesty on the part of any of his employees.

The space for the storage of cars will, of course, form the bulk of the space of the building. It is in this space that gasoline and oil are sold; it is here that preliminary examination is made of cars needing repairs. In a garage having a frontage of, say, 50 feet, this space will probably be better located at the rear of the office and salesroom. In wider garages, the whole of one side may be given up to the storage of cars, in which case it should be located preferably on the side farther away from the business center of the town—that is to say, people coming away from the business center should have to pass the offices and salesroom before reaching the garage entrance.

As the business of providing cars

with gasoline and oil is largely a cash business, the planning should be so arranged that cars may be replenished at some point near the office at which payment should be made. Some garages use a portable tank, others are equipped with pumps in a permanent location. In either case, the filling should be done at a spot convenient to the office so that payment may be made directly to the cashier.

Provision should be made for a good display of seasonable accessories to people who have been attracted by a display while their cars are being filled with fuel, oil, and water.

It should be borne in mind that the business of conducting a garage depends, for its very existence and successful continuance, on the combination of two very important factors: The measure of service given to the automobile-using public by the garage; and, second, the financial returns to the proprietor in the form of profits which makes it worth his while to devote his time and the use of his capital to the enterprise.

Some garage proprietors may be inclined to question my wisdom in assigning a position of premier importance to the "Service" element in the combination, inasmuch as to use the vernacular, no one engages in business "for the sake of his health." In other words, no one is likely to devote his time and invest his capital in any business were it not for the allurements of profits.

There is one thing about this wonderful country of ours, geographically; it is a country of great distances—and the coming of the automobile has had, and will continue to have, a great deal to do with the development of the country, just as the railroads have done in the past. The automobile has dissipated distances; it has lessened the loneliness of our agricultural population; it has provided a practical and efficient means of marketing the products of farm and factory; it has extended the borders of our urban centers in a manner little dreamed of 30 years ago. It has become a household necessity.

But like all luxuries which have become household necessities, the automobile needs attention, needs fuel, needs repairs, needs storage space when not in use, needs occasional overhauling, needs a great many added accessories to increase its utility; and because it needs all these things in reason and in season, the garage business exists. The garage business is essentially a business of service.

The patronage of a garage is drawn from two sources which may be broadly classified:

First, the permanent clients in the territory directly served, who, whether in the city or the country, find in the automobile a conveyance of utility.

Second, the transient or tourist clients who for the time being, either for pleasure alone or for business and pleasure combined, look upon the use of the automobile as a semi-luxury.

Every automobile user, therefore, is a potential source of revenue—and legitimate revenue at that—for every garage. Revenue, however, does not mean net profits at the end of a financial year.

Profits are what is left over after deducting the cost of doing business from the revenue. It is because I feel that in the majority of instances a greater percentage of profit may be made out of the same gross revenue, that this article is written. No garage business can derive the greatest possible profit out of its gross revenue in a poorly-planned building. It is to the proprietor's interest to start off at least on an even footing with his competitor in business.

The site of a garage is an important consideration and will doubtless have a great deal to do with the success of the business. Unless the proprietor intends that the sale of automobiles and accessories shall be the predominating feature, a corner site is not at all desirable. I am of the opinion that for many reasons, the L-shaped site is an ideal one for a garage, whether in the city or the country.

When a proprietor finds himself with a corner site possessing considerable depth, he may obtain an L-shaped site by building his garage to cover that portion of the site contained within the 50 feet farthest from the corner on each street. This will enable him to include in his building operations the erection of a suitable building on the corner itself which may be rented to other businesses, preferably to those which will act as natural feeders to his own business. By doing this, he will be able to derive a greater revenue from the space than he would if it formed part of his garage proper.

As a general rule, however, most proprietors prefer a plain rectangular site having a frontage of anything from 50 feet upwards. In selecting such a site, preference should be given to one having a lane at the rear—or one offering at least the possibility of planning the building in such a manner that patrons may drive in off the street and out again at the rear without having to back out.

It is impossible in an article such as this, to offer more than a few broad suggestions as to certain rules to be observed in the selection of a garage site. I find—or have found in the past—that almost without exception the architect is not consulted until after the purchase of the site.

Frequently the site may have been in the possession of the proprietor for many years, and the development of the locality has only just reached that point where the erection of a garage building is likely to be a profitable investment. In such cases, a satisfactory solution of the planning problem may generally be arrived at with sufficient study. In cases where the proprietor is contemplating the purchase of a site for the immediate erection of a building—and where he may have one, two, or more likely sites to choose from—he has everything to gain by taking the architect into his confidence, and benefiting by his professional advice before concluding the deal.

The planning of the building will depend not only on the particular characteristics of the site, but also on the proprietor's business organization. All business is nowadays, or should be, departmentized, with a responsible head for each department.

But it is unwise to form a hard and fast iron-clad organization, because

the end of each year may possibly find the business larger than the organization with which the year was started. It is a good thing to remember that the proprietor of a business should devote his time to the executive end of the business. His time is worth more to the business—particularly at the start—in providing his employees with work.

This is an elementary rule, it is true, but it needs emphasizing for a good many proprietors. Good, efficient workmen can attend to the details of doing the actual work when the work is provided for them; landing business requires executive ability.

The office, in most cases, will open off the salesroom, which is in the nature of a public reception room for patrons. A good car or two, well-displayed accessories, tires, etc., should be on view in the salesroom—and it need not be larger than will be sufficient to display these to advantage. The salesroom should open directly off the street, and will, of course, be provided with large plate glass windows.

The right location for the stockroom calls for a great deal of thought. Automobile parts, as well as accessories, are generally expensive—they are easily misplaced, taken away accidentally perhaps, or mysteriously lost. The loss of parts from the stockroom is one of the most serious leaks with which a garage proprietor has to contend.

In the ideal plan, the location of the stockroom should comply with the following conditions: It must be conveniently located with respect to the repair shop in order that there shall be no loss of time in securing parts needed for repair work; it must, unless the business organization is a very large one, be so arranged that all traffic between the repair shop and the stock will be under the immediate control of the business office; it should also contain the stockroom for accessories.

It is desirable that these accessories may be placed on display in the street window, in the window displaying accessories in the garage space, and on display in the salesroom if possible without being removed from the stockroom—that is, the displays may be in the form of three show windows, one on the street, one in the garage space, and one in the salesroom. If these could be arranged in

such a manner that the space behind the three of them forms the stockroom, allowing displays to be made and changed through doors or windows at the rear of the show windows, we have an ideal arrangement.

The repair shop should be fairly large, and well lighted. If it be located at the rear of the building, it is desirable that cars be taken into it through the rear lane. It should be provided with strong enough beams in the ceiling so that cars may be hoisted off the floor, if necessary, by means of a chain block and tackle. Work tables should be provided along the walls having windows in them.

The efficiency of the repair shop will depend to a large extent on the equipment with which the proprietor intends to operate it. In a great many garages, a paint shop is necessary. Precautions should be taken on account of the highly inflammable nature of the material used in this class of work.

The battery room should be located off the repair shop if possible, in a room entirely cut off from the repair shop. It should be well-lighted and free from dust.

The heating installation for a garage building should preferably be a steam one. Failing this, a warm air plant can be installed, which should do efficient work. A great deal will depend on whether the proprietor intends to heat his storage space for cars during the winter months, or not.

And last but not least, attention should be given to the ventilation. One of the most dangerous gases known to science—carbon monoxide—is the product of combustion, and this invisible but most deadly gas is one of the gases discharged through the exhaust of the automobile engine. Perhaps some day there will be a law which will penalize people who leave an engine running within a confined space. Until this is done the only dependable safeguard is sufficient ventilation, particularly of the storage space and repair shop.

#### Advertise Now Or—

And when he dies, go plant him deep,  
That naught may break his dreamless sleep:

Where no rude clamor may dispel  
The quiet that he loved so well;  
And that the world may know his loss,  
Place on his grave a wreath of moss,  
And on the stone above: "Here lies  
A chump who wouldn't advertise."

# "Keep a Pare of Eyes in Your Head"

"The Boss Said, "Taik the Rest of the Afternoon Off Becuz I Lookt Over the Seller and Found Out Some Things About Our Seller and, Say, I Lernd Sumthing About Drummers, Too—It Pays to See Sumthing Besides a Meel Ticket"

By Frank Farrington

I always thought drummers was a nusanse diddent you Pete? I notis that when I go and tel the boss theres a drummer to see him he acts as if he wisht the feller wood choak to deth or sumthing.

So when a man cum in this morning and set a big sampel case on the flore and askt me, "Is the proprietor in?" I supozed he was a traveling sailsmun and wanted to sel the boss a new kind of unpunkchurabel tires or sumthing and the boss woodent want to see him and I sed the boss was bizzy and couldn't see folks.

"How long is he going to be so bizzy?" the feller askt me and I sed I gesst all the forenoon. The feller stood and lookt at me like he was wondering what to do next and then he sed, "Yung man, you look like an intellijent kid. Dont you kno better than to think Ide buleve that stuf. Run along and say to the boss that mister Izik Johnson is heer to see him with is full line of sampels of oils and greeses. Taik my word for it. He wunt be too bizzy to see me."

"Qwit your kiddin," I sed. "I dont dare but in the offis when the boss is bizzy. Ide get fired."

Just then the boss cum around the corner and I thought I was going to get fired without buttin' in at all. But I gess this is my lucky day becaws the boss diddent say ennything to me but just walkt up to Izik and held out his hand and sed, "Gosh Ike Ime glad youv cum. Ive bin havving the darndest time trying to get your stuf from the jobbers. Bill, bring mister Johnsons sampel case into the offis."

Now what dyou think of that? I gess Ive had the rong dope on this drummer stuf. And I can see that a

garaje man ought to be glad to see a man whose cum a long ways to sho him things and to explane that theyer going to sel. I was talking to Spike about what a brake I made and he sed did I kno old Morrison the feller whose got a dinkie littel shop down on Pike strete. And I sed yes becaws Ide bin down there to try to get things and he never had enny.



That Seller Wuz a Regguler Bonfire All But a Match or a Spark or Sumthing.

"Wel," Spike sed, "theres a gink who wont see a traveling sailsmun becaws he alwys thinks theyer out to trim him and he buys everything from a jobber that sels by male and you kno what kind of a joint heze got. I tel you a man has got to kepe in tuch with the times, and one of the good ways of doing it is by seeing all the traveling men. And the other is by reeding his trade journal from covver to covver."

I sed, "Spike Ive lerned sumthing today," and Spike sed, "Heres manny happy returns of the day!" Heze a grate kidder sumtimes.

And when frend Izik cum out of the bosses offis the boss sed, "Bill, give mister Johnson a hand with his sampel case to the hotel."

Wel, I went rite along without saying a word. I thought mebbly it was a good skeem for me to be a good feller with a drummer too as wel as

for the boss to be. I diddent looz enny munny going at that for Izik giv me a qwarter when we got to the hotel and he sed, "Sun, you just kepe my competeters out of the offis like you tride to kepe me out and Ime your frend." But I aint going to play enny favrits. Mebbly the other fellers got a good line too—and also a qwarter.

I pretty neer lost the qwarter at that. I was looking in a window at a sporting goods store and the qwarter droppt out of my hand and roled thru the only hole they was in the dedlite under my fete. Can you beat it? I went in and told the man Ide lost a qwarter thru his dedlite and cood I go down seller and get it? He sed, "There's the seller dore, help yourself."

Say, talk about your sellers! I cant see why that seller dont blo up. Its ful to the nek with exsellsior and papers and paper boxes and packing stuf and if ennyboddy went down there with a match or a lamp or even a littel hot under the collar—kerflooie! I gess that guy never herd of fire prevenshun weke or if he did he oppozed it.

First I thought I woodent go down for feer the plase mite get on fire from my red hare and the man wood hav me pinched, but then I thought of the qwarter and went. When I cum out I sed, "Say mister, if I lived over that bonfire Ide be shure I was a good church member."

He sed, "What dyou meen, bonfire?" And I sed why that seller was a regguler bonfire all but a match or a spark or sumthing. And he cum rite back, "You be on your way and mind your own bizness if youv got cnny. My sellers saif enuf to sute me." Just as I was going out the dore

I sed, "Yes, mebbly it sutes you and mebbly it wood sute you better yet if it had a match there too." The old firebug!

Then I got rite back to the garaje as fast as I cood and I went down in the seller thats under the sales rume and offis and I lookt around our heeter and buleve me Ime glad that other ginks seller set me thinking about such things becaws sumboddy had piled a lot of paper and rubbage all around our furnis. There was a good fire there too and ashes on the flore rite by the papers and Ile bet that Persy wood hav bin down there

in a littel while and put more papers on top of the hot ashes. Thats about as much as he knoze about sum things Wel, I mooved things so theyd be saif for then.

And I lookt over the smoak pipe and I found one plase where it had a hole you cood stick a finger thru and I did and burnt my finger at that. I gess everyboddy gets careless about their heeters sumtimes and thinks about it after the fire.

I told the boss about the stovepipe hole and the papers and things and he sed, "William, its worth sumthing to hav a pare of eyes in your hed

that can see sumthing besides a meel tickit. Ile say you aint as blind as you mite be. Carry all those papers out-doores and go to the hardwair store and tel em to cum and put in new lengths of pipe wherever it needs em. Then taik the rest of the afternoon off for an extra holliday, and taik it from me, if you want to see a fire. just stick around that sporting goods store during your idel minnits and youll probably get your wish sum day."

It aint burnd yet, Pete, but Ile bet it will.

Your old pal,  
Bill.

## "Hey, There! How's Road Ahead?"

An Eastern Garage Struck upon the Idea of Maintaining a Bulletin Board upon Which Information Concerning the Road Ahead Was Given—It Found Both Tourists and Local People Appreciative and the Plan Remunerative

By Harry Botsford

There is a certain, hustling garage in a city of 20,000 in Pennsylvania that is gradually increasing its business by a clever and rather inexpensive plan which daily attracts many motorists—all potential customers—to the garage. The scheme seems to me to be unique in every feature and I can see no reason why an adoption of this garage's plan cannot be made by the average garage and why such a scheme cannot make money for the garage, but likewise attract considerable favorable publicity to that garage.

In front of this garage and facing both ways of the street, is a large bulletin board sign with letters a brilliant red that reads:

"The Road Ahead."

All automobilists—both tourists and local people—usually swing their machines up and read the bulletins on the board. These bulletins cover road conditions in and out of the city in all four directions. The board is divided into four sections, covering north, south, east and west.

Each morning the information regarding road conditions, detours, bridges, wash-outs, and bad pieces of roadbed, is secured by the bookkeeper at the garage by a liberal use of the telephone.

Aside from this, the bulletin board also contains other items of interest to the motorist. Many of the roads leading out of the city have interesting or historic places that might be

missed by the casual motorist unless his attention is directed to the spot. These places and spots are definitely located on the road bulletins, and this one feature of the service is one which is very much appreciated by the tourist and by local people, too.

There is always a large number of people—the number is surprising—that like to go out in the country and purchase directly from the farmer fresh butter, eggs and vegetables and fruit. Just where to make these purchases and the prices asked is also a desirable feature of this bulletin board. This information is secured from the farmers who give information relative to the road conditions near their farms. The farmers, as a whole, are immensely pleased to give this information in return for the free advertising they receive.

In addition to the bulletin board, the garage will give the motorist on request, a copy of any one, or all, of the smaller bulletins. This is a great convenience to both tourists and local people who call for these route-slips each day.

There is not very much work connected with the operation of a service of this nature as the bulletins are made out on a cheap, but efficient, duplicating device that is used for other work in the garage office. This eliminates the use of much time in the preparation of the slips.

That the free information is appreciated is to put the matter mildly.

Each day the garage receives a large number of telephone calls for information in regard to certain road conditions and routes. This information is, of course, given freely and cheerfully.

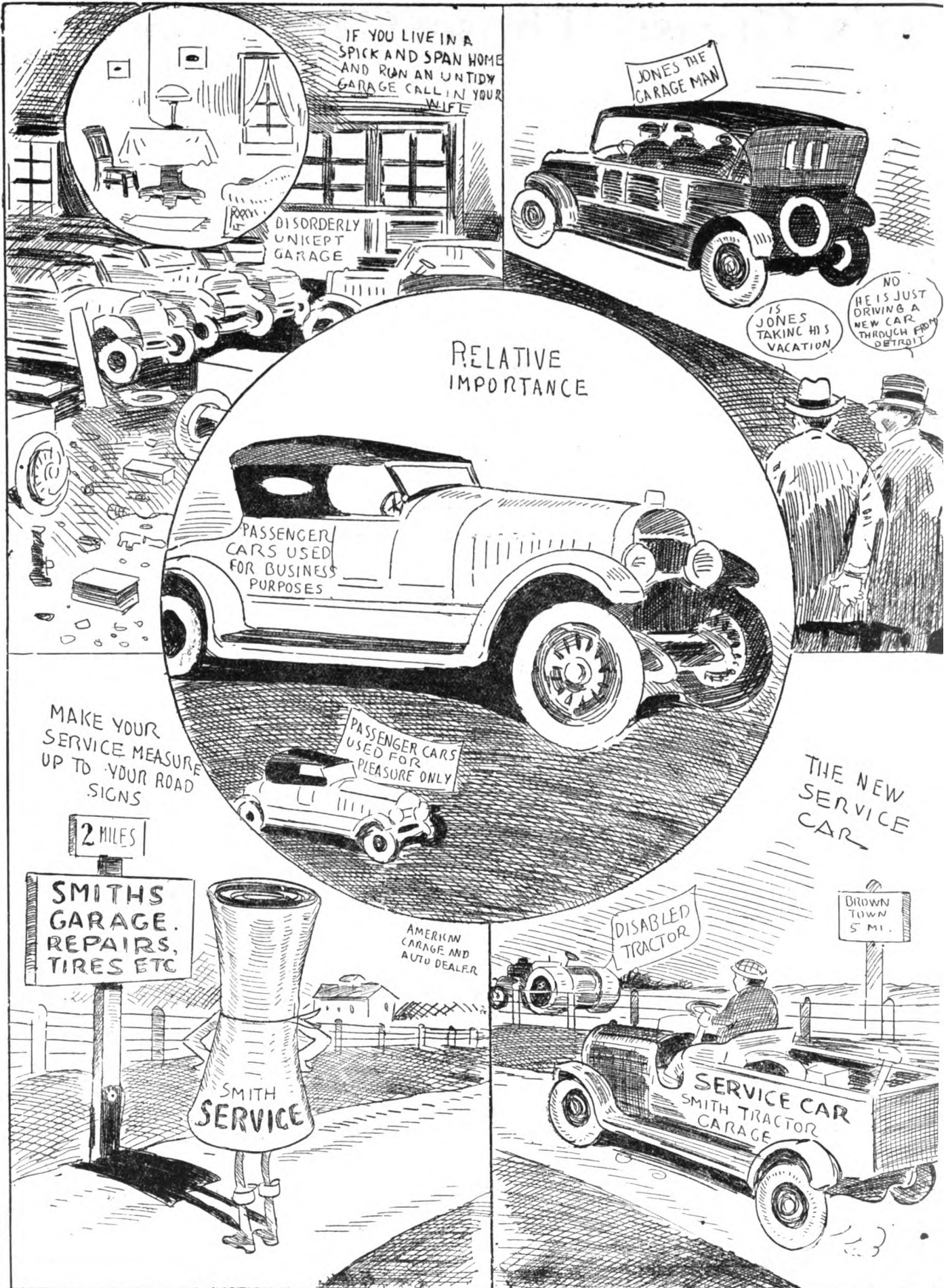
"Fine," you say, "for the motorist, but how does this scheme work out for the garage? How does it benefit for the work put in for the operation of the idea?"

All in all, the plan has worked out to the distinct commercial advantage of the garage. For example, people drive up to the bulletin board. They read the whole list and decide on a certain little drive. Now the first thing the driver thinks of, after he decides to make a trip, is whether or not he has sufficient gas and oil for the journey.

Right beside the board is the garage's filling station, and it is very natural for the driver to get the tank filled right there. The same thing is true of accessories, and the garage manager tells me that the garage is now selling more accessories than it did before the board was placed.

Again, there is the important feature of making friends to be considered. No business can have too many friends. The garage makes friends, by extending to all a free and necessary service. To take advantage of this service and not to reciprocate, is to be ungrateful, and the garage feels sure that the average motorist is not ungrateful, by any means.





# Let's Grease Those Cars Honestly!

Proper Lubrication Is a Vitally Important Problem—Many Owners Grease Their Own Cars Better Than the Shops Do—It Is the Garageman's Duty to See that Every Car That Comes in to Be Greased Up Gets a Square Deal

By Nat M. Johnson

Greasing a car as practiced in the average garage is a joke—a tragedy when considered how vitally important it is. We hear a good deal about "proper lubrication" but outside of the motor, we don't see much of it.

And it isn't always the car owner's fault. Most owners have their cars greased regularly—many of them grease their own cars better than some shops do.

In a good many shops the customary procedure is about as follows:

The car is driven in, the owner says: "Grease it thoroughly." And he may add: "Look over the car and tighten any loose bolts and nuts you find."

A helper, or perhaps a negro porter, is put on the job. He screws down a few grease cups that turn easily, smears grease on others, squirts oil around where it will show, gets a generous supply on the steering wheel, cushions and fenders, absolutely passes up the universal joint and many cups difficult to reach but serving important functions, and usually omits all wheels. Then with a gun, forces 600-W oil by the quart into the differential where very little, if any, is needed.

A look here, a promise there, will do for the loose bolts and nuts and with a stab at cleaning, Mr. Man's car is ready to roll. He pays cheerfully for this service, albeit his bill includes a few pounds of grease and stuff that would be hard to find, and goes his way. His conscience is clear, now that his duty to the car has been attended to.

Recently a man drove into our shop for the first time and said that he wanted his car greased, adding that he would just wait for it. When told that it would take from an hour to an hour and a half to do the job thoroughly, he was very much surprised, suspicious, I might say, and informed us that his regular shop required only 15 minutes for such a job.

I asked him to stay and watch the

mechanic do the work and then tell me if he thought it could be done right in 15 minutes.

The mechanic showed him dry spring bolts, and shackles badly worn; spindle bolts that allowed the front wheels to wobble and made steering difficult, worn because no oil had gotten into them for months.

This condition prevailed pretty much all over that car and the man was convinced. Next day he came back and had many dollars' worth of bolts and bushings put in his car. This would not have been necessary

set of brake linings, considerably more than it would have cost him had he gone to a reputable repair shop in the first place. But, no, he was attracted by the "free" sign and thought to get something for nothing. What he got was experience for which he paid the usual price at the regular rate.

You ask the average man what he thinks of automobile repair shops as a business industry, and he will generally tell you it is almost as crooked as the oil game. Not that there are not legitimate oil companies and some honest promoters, but the public have been taken advantage of by dishonest men until they are suspicious of every oil company, and the very words, "oil stock," affect them like the proverbial tale about a red flag and a bull.

This condition is truly regrettable. Being such a factor in the ever-increasing giant automotive industry, repair shops certainly ought to be reputable business concerns. Let's treat our customers right, make them our friends and increase our business standing!

## New Method of Computing Tire Wearing Qualities Discovered.

A new invention for determining the life of rubber products, particularly automobile tires, has been discovered by Miss Irene C. Diner, a student in New York University. At a recent meeting of the rubber section of the American Chemical Society, of which she is a member, Miss Diner also advanced an entirely new theory of vulcanization and of elasticity.

The invention is said to make it possible to foretell much more accurately and surely than heretofore by microscopic examinations and certain wearing qualities, which she discovered, the actual miles any automobile tire may be expected to travel.

A discovery like this should be a great help to manufacturers.

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## HONOR IN BUSINESS ALWAYS AN ASSET.

To fulfill every promise; to mix integrity with every article you sell; to be courteous and kind; to be fair always to all men; to build up with hope for better things as your guiding star; to keep faith with others, as well as yourself; to try to do the thing better than it has been done; to hate sham, shoddy and bombast—of such is the kingdom of successful business.—Rotarian Service.

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for months, if the car had been honestly greased in his regular shop.

Several gasoline stations in our city adopted the plan of greasing cars free, charging only for the grease and oil used. Now a man's time is worth something—let no one expect to really get something for nothing—so the gasoline company had to use enough material to pay for its time. Its man forces as much lubricant into transmission and differential as they will hold.

The result of this is that in a very short time the oil works its way out through the rear wheels to an extent that the brakes won't hold and the wheels are unsightly.

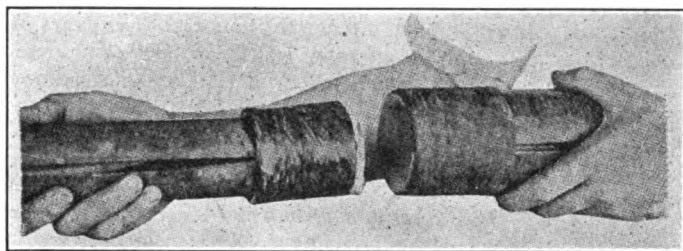
The owner goes back to the gasoline station and is told that he needs new rear-wheel felts and is referred to a repair shop. No felt on earth could keep that avalanche of oil from working out. So the car owner has to pay to have the rear wheels taken off and washed, the oil drained down to correct levels, and maybe a new

# Repairing Automobile Tires for Profit

The Second of a Series of Articles Dealing with a Remunerative Source of Repair, That of Tires—In This Issue the Reader Will Find Invaluable Information in Regard to Splicing of Inner Tubes—Types of Vulcanizers

By M. E. Faber

When a tube has been blown out so badly that a patch is impossible, it may often be repaired by splicing in a new section. This must be done carefully so as not to twist the tube or change its length.



How the Tube is Placed Over the Splicing Mandrel.

The section to be inserted is taken from an old tube of the same size, and should be cut five inches longer than the piece which was removed so that  $2\frac{1}{2}$  inches will be left at each end for the overlapping of the joints. Bevel the edges of both the tube and the section by cutting with a sharp knife, or by placing over a piece of board and grinding on an emery wheel.

Clean the ends of the tube on the outside for three inches and ends of the new section an equal distance on the inside.

For ease in putting the splice together, splicing mandrels are generally used. These consist of a pair of sheet metal tubes about eight inches long which are split down one side. One of these tubes is about  $\frac{1}{4}$ -inch smaller in diameter than the other.

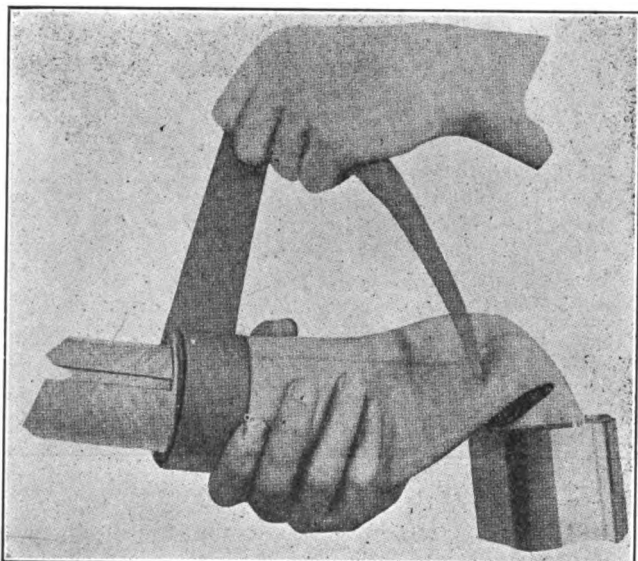
Put one end of the tube through the smaller mandrel and turn it back over the mandrel for five inches; then turn it for-

ward again half that distance thus making a double fold. Put one end of the new section through the larger mandrel and simply turn it back  $2\frac{1}{2}$  inches.

After the tube and section are on the mandrels, the method of joining will depend on whether the repairman prefers to use acid-cure cement, or whether he prefers to vulcanize. The latter method is preferable because, although it takes a

little longer, it makes a repair that will not loosen, in case a puncture makes it necessary to again vulcanize at a point that will bring the splice in contact with a heated vulcanizer.

If acid-cure is used, proceed as follows: Apply two coats of acid-cure cement to the cleaned surfaces of the tube and section. Give them plenty of time to dry. Bring the two mandrels together and ap-

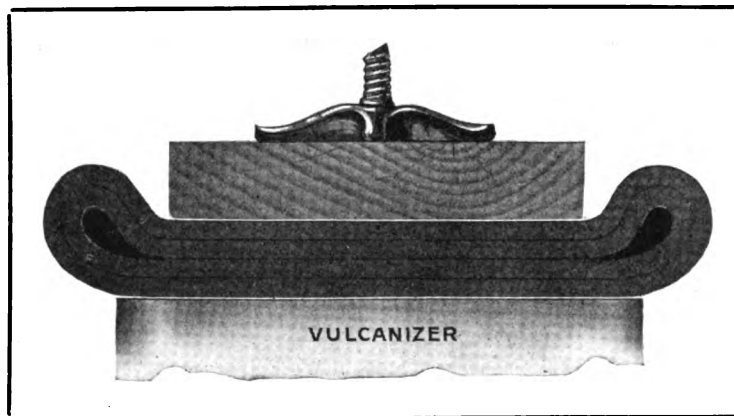


Wrap the Splice with Strips Cut from an Old Tube.

ment is used and at least three layers are applied to the cleaned surfaces of the tube and the section. The ends of the splice are brought together and the mandrels removed. The vulcanizing is done in three operations—the first of 20 minutes' duration, the last two of 15 minutes each. A block is used, as shown in one of the illustrations, to prevent pinching the edges of the tube.

After the first part of the cure is done, the tube is turned one-third of the way around so as to bear on a different place. The third part of the cure is made in the same way as the second, after giving the tube another one-third turn.

Another method of getting the ends of the tube and section together neatly is to



Use a Block to Prevent Punching the Edges of the Tube.

insert into the tube a bottle or tin can. After the ends are in place, this object is removed by cutting a slit in the tube somewhere and later vulcanizing it shut. Select a good place on the tube and clean a space about  $2\frac{1}{2}$  inches by 4 inches. In the center of the clean space, cut a  $\frac{1}{4}$ -inch hole. Remove the nut from the metal valve stem and push the stem through the hole in the tube, allowing it to remain clear inside and away from the patch until after vulcanizing.

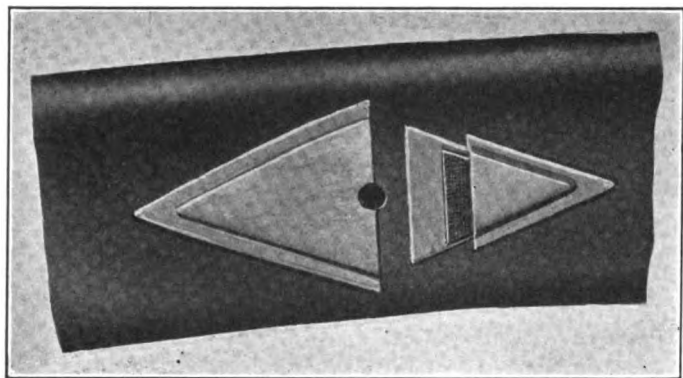
Cement the cleaned surface around the hole in the usual manner. Cut an oval or diamond-shaped piece of thin raw rubber about 2 inches by 3 inches. Make a hole in the center to correspond with the hole in the tube and roll it down on the tube so that the soles register. Cover this rubber with a piece of fabric of the same size and shape. Then cover the fabric with a sheet of thin raw rubber of the same shape but about  $\frac{1}{4}$ -inch larger all around.

Holes should be cut in the fabric and in the last layer of rubber to match the hole

(Copyright by M. E. Faber.)

in the tube. Place a wad of paper in the hole to keep it open and vulcanize for 40 minutes.

When the patch has cured, shake the valve stem to the vicinity of the hole and



The Sectional View of the Valve Stem Slat.

force it through the opening until the base rests against the inside of the tube. Screw down the nut on the outside.

#### High-Speed Tube Repairs

A new type of vulcanizer recently placed on the market is becoming quite popular because of its simplicity and the fact that it uses in a commercial way the patch and heat units which most garages carry in stock to sell to motorists.

#### Five-Minute Type of Tube Vulcanizer

Each of these patching units is really a complete vulcanizer. There is a little metal pan containing the correct amount of a solid chemical fuel that burns without flame. On the bottom of this pan is a patch of uncured rubber. The metal pan which acts as the vulcanizing surface, is concave on the bottom so as to mould the repair to a feather edge that it is impossible to loosen. These units are made in several sizes so that cuts and tears as well as punctures can be mended.

To mend a puncture, the tube is cleaned with sandpaper and one of the pans placed on it so that the rubber patch is centered over the puncture. The tube is then put into the clamp and pressure is applied while the fuel burns and the pan cools. At the end of five minutes, the pan is removed and thrown away like a dull razor blade.

This process appeals particularly to the shop that wants to cater only to the tube repair trade as well as to the fully-equipped shop that needs an auxiliary quick-operating outfit.

#### Getting the Money for the Work.

By Frank E. Morris.

*Mgr. Quick Tire Service, Dallas, Tex.*

I ran across a fellow the other day who was selling a system of collection letters. The letters ran in a series of one, two, three, four and five.

Mildly and gently, but most firmly, these letters were intended to convey to a debtor that the creditor who mailed them to him, actually felt that he had some

rights left with regard to the amount due. Furthermore, that he intended to collect it.

Letter No. 4 was in the shape of a final demand. This letter wound up with the declaration that unless the account was paid it would be turned over to the collecting company for attention. The attention the company promised in its contract to give was to use all legitimate means in its power to force the debtor to pay. Among these means was mentioned publicity, newspaper, billboard and hand bills to be circulated by mail.

The system so appealed to me that I asked for letters of commendation of the system, and the names of local users. These being furnished, I took a night off and studied the matter very thoroughly.

When a man guarantees to make me a thousand per cent in an oil investment I laugh. After I have laughed, if I want to take a chance, I shut my eyes, hand him my money and say "inny, minny, miney, mo." Then I laugh again, accept the stock certificate and put it in the safe with all my other "cats and dogs." In the dim future when my money has not come back with golden wings, I take out the stock certificate, kiss it, throw it in the waste basket, and repeat Barnum's formula.

It's a different thing when a man sells you a system for collecting accounts, and guarantees that if six times what you paid for the letters is not collected, he will refund you three times their cost. So I investigated his ability to live up to this part of the contract.

Found that was O. K., and became a firm believer in the merits; so firm a believer that I was quite willing to recommend it to my friends as well as try it myself.

Strangely the first objection that I had to meet in arguing for the system was that there might be some liability attached to publishing an account for sale. This objection causes me to wonder if credit

men and business really know the laws of the land in which they live. It is my firm belief that ignorance, more than any other agency, keeps more people from enjoying the fruits of more good things than are spoken of in my philosophy.

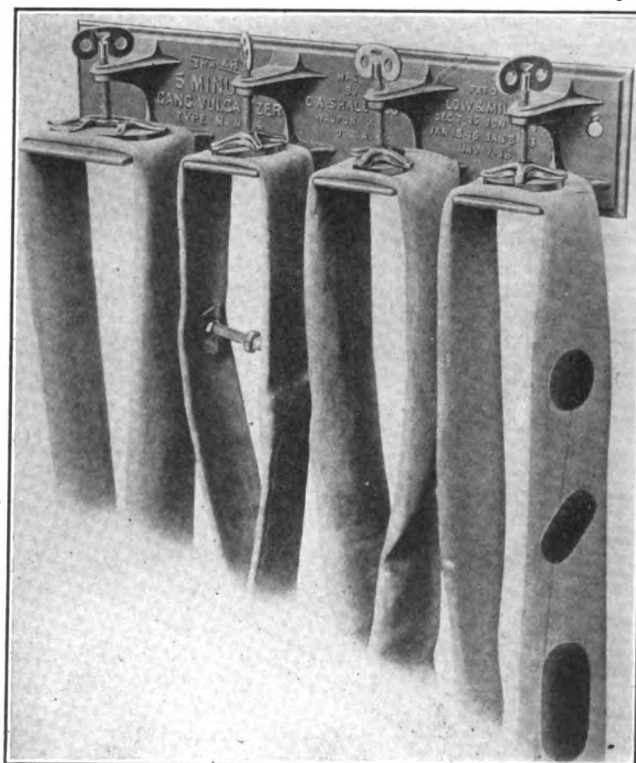
It is the sad experience of all business that for fear of offending some one, accounts are permitted to become delinquent. Then as a matter of course they are neglected until they sluff themselves off the oblivion of the profit and loss account.

I found, among the users of the system, a lot of people who were tickled to death. They took the guarantee at its face value. They dug up accounts that were years old. They went after them. The results were amusing and interesting. People were awakened to the idea that a bad account is a mean thing to have hanging over one's head. They were afraid of the publicity, although they had not been ashamed to owe the amount for four or five years. It's different when other people know.

Doctors reported that they not only collected the money, but that they won back their patients. Dentists found that gold they had put into teeth four and five years before, was now returning to them like bread cast upon the waters.

A garage owner referred to a host of his former customers, who seemed to be immune to all his other requests for payment, as "those silk hat deadbeats, who are breaking their necks to pay."

What has helped me, the baker, the



The Five-Minute Type of Tube Vulcanizer.

candlestick maker, the dentist, the doctor, the grocer, the proctor, will help you. Let's get the money for everything we sell, and get it all!



# The Farmer as a Buyer of Trucks

Is the Farm Market of Great Value?—Farmers Are Biggest Users of Trucks—  
There Is a Potential Market of Great Possibilities?—Paper Presented at  
Conference of National Association of Motor Truck Sales Managers

By F. W. Fenn, *Secretary,*

*Motor Truck Committee, National Automobile Chamber of Commerce*

We hear many people say, "the farmer market can never be considered one of very great value," giving as a reason the fact that it cannot consume sufficient tonnage to be of much value and, therefore, is worth very little sales effort.

As a matter of fact, the farmer has been buying trucks and is still buying them, although very little sales effort has been made to influence him. He has become a buyer of motor trucks because he needed them on his farm, and every year he is going to need them in greater quantities than he does at present.

Although sales have not been directed to the farmer, he is today, nevertheless, a bigger user of motor trucks than any other single branch of American industry. The Department of Agriculture reports that there were 78,000 motor trucks used on farms in the United States up to last December.

The fact that the farmer has bought a product on which he has not previously been sold—a product which has served and stood up under the severest kinds of work with little or no service behind it—speaks well for the product turned out by the motor truck factories of America; and, in spite of this lack of service and sales effort, he is becoming a larger buyer every year.

While the rural field has scarcely been touched—for 78,000 trucks in this field are nothing compared to what it can and will become—the urban market is fast being sold to capacity and sooner or later is going to be oversold.

Motor trucks cannot be sold as passenger cars are sold, and they do not command the market which the passenger car enjoys; therefore, in selling motor trucks "transportation" should be the keynote.

In the Middle West, where trucks are being used extensively on farms,

in answer to a questionnaire recently sent out by the Capper Publications, practically every farmer stated that his truck was the busiest piece of machinery on the farm. It is claimed that the size of truck most used by the farmer runs from  $\frac{3}{4}$ -ton to 2-ton, but that on many of our big Western and Southwestern ranches, three and 5-ton trucks are being used

find that only 2.2 per cent of the potential market has been sold on the actual use of the motor truck.

If we are to develop the farm market, service should be placed within fairly easy reach of the farmer-buyer, for the truck must be kept on the job at all times when needed.

In order to protect the market in your own town encourage the formation of local Motor Truck Owners' Associations. It is advisable that these truck owners' associations should be a part of the local automobile dealers' associations. These owners' associations should be composed of all motor truck operators using the highways. This will help you to fight legislations of an injurious character, many of which are being introduced in various states and which, if allowed to continue, will act as a stay and will hamper the advancement of motor transportation.

Summarizing: The farmer is in greater need of the motor truck today than he has ever been before. The farmer, as a market, is easy to sell, but he is not so easy to educate and will, unless he receives proper service and proper instructions, violate his part of the agreement by overloading and will lay the blame on the product.

During the past year and a half, the motor truck committee of the National Automobile Chamber of Commerce has carried on an extensive educational campaign in a large number of papers scattered throughout the United States. This covered papers in all principal cities, small towns and rural villages and farm papers of all kinds. From the returns received, we know that the farmer throughout the country has been developed to a point where very little additional campaigning is necessary to sell him, for he is aware of the advantages of the motor truck.

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## The Motor Truck

I am the Motor Truck—of damaged highways,  
Ruts and holes, the cursed beginning.  
Yet hear my self defense! I claim  
I'm far more sinned against than sinning.

I plod neglected, time-worn roads,  
Until my parts all ache with strain;  
I haul freight cheaper, quicker, better;  
I slave, I sweat—all for the nation's gain.

I am a public servant, patient,  
Drudging utility of trade.  
Yet they would stint me rather than  
To build good roads to give me aid.

My railroad brother once outgrew  
His rails by hauling increased freight;  
He wasn't held down to the rails—  
They built the rails to hold his weight.

Unbar the gates that hold me back,  
If you would have me haul your loads.  
I'll do my part, if you'll do yours—  
Just give me more and better roads.

P. L. Sniffin, International (Mack) Motor Co.

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to quite some extent. It is also stated by several authorities that when good roads become the rule, three and 5-ton trucks are going to be the units which will be sold to large farmers.

The number of motor trucks now used by farmers is 10,000 more than the next nearest class of users. The total number of farms in the United States is 6,361,502, of an average size of 140 acres. A conservative estimate is that there is a potential market for 2,120,500 motor trucks for these farms. Comparing this number with the number already in use, we

# Establishing the Lathe for Efficiency

Purchasers of Lathes, Especially Those Who Are Inexperienced in Installing and Operating Such Equipment, Will Appreciate This Article Which Takes Up in Detail the Proper Placing and Operation of This Machinery

By J. N. Bagley

Hardly a day passes but that a lathe leaves the factory to be installed and operated by some one who has never had any previous experience with such equipment, so a few words regarding the installation of a lathe will undoubtedly be appreciated by many readers of the *AMERICAN GARAGE & AUTO DEALER*. Of course, most purchasers of lathes are mechanics and have a very good knowledge of the general workings of the lathe, but nevertheless a few hints may prove of value in getting the machine started right.

When the machine arrives from the factory, it is usually crated and the smaller parts are found in a box. Care should be taken in unpacking that some of the smaller parts are not overlooked in the wrappings. There will also be quite a little excelsior in the box and crate and many times some of the smaller parts are carefully put away in this. When all parts are removed from the crate, the lathe is ready to put together as soon as the bright parts are cleaned of the grease that has been used to prevent rusting.

A very good plan is to use a soft rag saturated with kerosene for removing the grease from the bright parts, as this will cut the grease quite readily. After it has been well cut up with the kerosene, a clean dry piece of the cloth can be used to advantage to dry and remove the particles of grease that are left. All the gears should be thoroughly cleaned of the grease and sawdust, as well as particles of dust accumulated while in transit. Now that the machine is cleaned and all the parts have been put together, following the instructions from the manufacturer, the lathe is ready to locate.

## Selecting the Location for Lathe.

One should make it a point to select the most desirable location in the shop for the lathe. Many things must be taken into consideration in selecting the location, such as the position of the line shaft, position of the belt, direction of the light. The light should come over the right shoulder at a point higher than the operator.

The floor on which the lathe sets should be sufficiently solid to make a firm founda-

tion, as the lathe will not give the best results if it trembles on a weak floor. If the floor is wood and not sufficiently strong to hold the lathe without trembling, it can, no doubt, be blocked or reinforced from the under side in such a way that the lathe will stand firm and rigid.

Plenty of room should be allowed all around the lathe, for one never knows when some piece of work will require an extra amount of room to handle. For instance,

are of the same size. However, this is but a matter of choice as some prefer the pulley on which the crossed belts work being quite a little larger so that while engaged in threading of shaft the return can be made quite a little faster. This will save considerable time and is a very good plan.

A very good pulley to use on the line shaft is the wood split pulley having a crown face. The crown face is necessary to keep the belt from crawling to one side and slipping off when a heavy cut is taken. The head end of the lathe should be kept quite a little distance from the wall as most lathes are now equipped with a hollow spindle permitting of a shaft being passed through from the front of the lathe.

After the countershaft has been placed in position, the next step will be to set the lathe in position as shown in Fig. 1, care being taken to place it in such manner that the belt will track between the spindle cone and the countershaft. It does not matter whether the lathe is under the countershaft or from two to ten feet either side, so long as it is lined with the cone pulley on the lathe.

Care should be exercised to level the lathe up very accurately, for a great deal depends upon whether or not it is level and rigid. This

can be determined by placing a level on the lathe bed in different positions. Should the lathe be found out of level, place shims of wood, or fiber, under the feet of the lathe until it registers level, when it should be made fast to the floor with lag screws or bolts.

Should the floor be of cement, lag screws cannot be used, but holes can be chiseled out and carriage bolts placed with heads down, extending through the holes of the feet and held in position by the nut on the top side. Have the hole a little larger at the bottom than at the top and fill the hole around the bolt with melted lead. As soon as the lead is cool, tighten the nuts on the top of the feet and the lathe will not move or tremble. Care should be taken that no water enters the holes in the cement before the hot lead is poured, or it is liable to spatter endangering the worker's face.

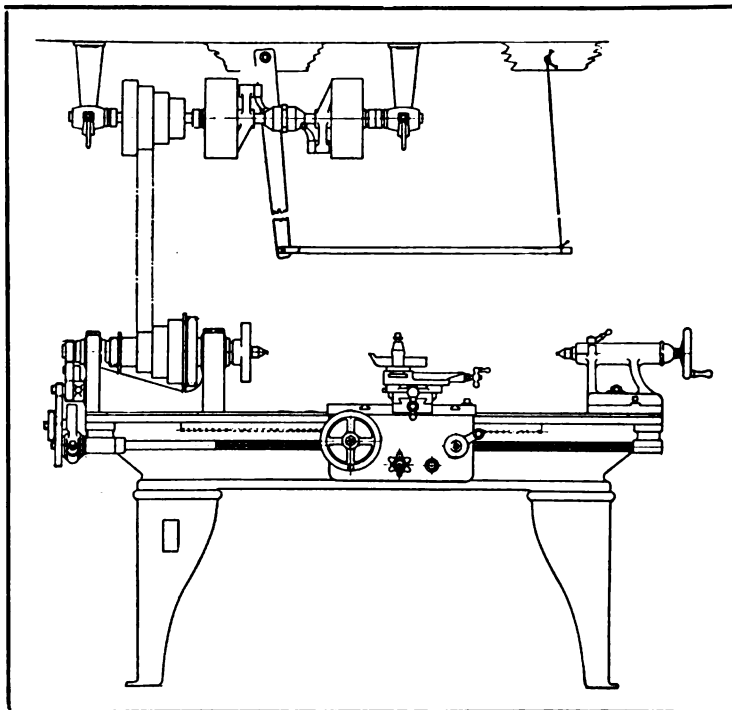


Fig. 1—After Countershaft Is Placed, the Lathe Is Set Into Proper Position.

it may at some time be necessary to turn a shaft four or five feet longer than the lathe bed, in which case it can be suspended by the steady rest while the cut is taken off. Then again, it may be necessary to place a shaft or casting in such position that the operator will want to work from both sides of the lathe.

The countershaft for the lathe should be attached to the joists or floor, whichever the case may be, about five or six feet from the line shaft and leveled up very carefully, exercising great care that the axis is parallel to that of the line shaft. Two belts should be used from the line shaft to the countershaft, one being straight and the other crossed, making it possible to run the lathe spindle either forward or backward at will by shifting the clutch lever from left to right.

Usually the two pulleys on the line shaft

It is always advisable to use a good grade of leather belt if possible, for that gives much better service than belting made of other materials. The smooth side of the belt should be run next to the pulley for the

Select a good grade of machine oil and use it frequently—only a little at a time or it will run out at the bearings and accumulate dust, making it a task to keep the lathe clean. Every revolving part of the lathe should be oiled. It is a very good plan, in oiling the first time after setting the lathe up, to use a sufficient quantity to flush out the dust that may have accumulated while the lathe was in transit.

two or three times a day for the first week, after which it need not be looked after so often.

Now that the lathe is oiled up ready for use, we will determine if everything is in readiness, by locking the cone to the spindle with what is termed the "bull gear clamp," causing the cone spindle to be revolved with open belt. Throw out the back gear and gently pull in the shifter rod, starting the spindle on open belt. If it works free in this position, stop it and loosen the "bull gear clamp" and slide it in and lock it. Now pull the back gear lever into position and shift the shifter lever again and note if the machine operates free when the back gear mechanism is engaged.

#### Don'ts

Don't throw in the back gear while the lathe spindle is running, for some of the teeth will likely be torn from the gear.

Don't throw out the back gear while the lathe spindle is running; the points of the gear teeth will be ruined just as they separate.

Don't forget to replace all covers over oil channels after oiling, or dust will accumulate and work into the bearing.

Don't connect or disconnect change gear or bracket gears with the stud gear when the lathe is running, for there is not only danger of ruining the gears, but there is danger of getting the hands caught between the teeth.

Don't use the lathe centers for prick or center punches.

Don't run the chuck or face plate up to the shoulder of the spindle suddenly. It not only makes it hard to remove but damages the shoulder of the spindle.

Don't expect the center to be true unless it is free from dust when it is placed in the tail-stock.

Don't try to use the micrometer or calipers on a shaft while the work is in motion. The fit is liable to be close enough to the caliper opening to grab and ruin the instrument, or damage the work, in case it is of a delicate nature.

Don't use waste about the gears to remove grease when they are in motion. Many a man has lost his hands from just such a procedure. It's a dangerous one.

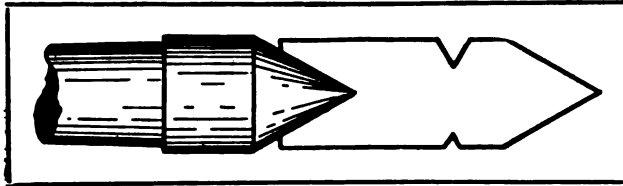


Fig. 2—To Determine Whether Lathe Center Needs Truing Up, Place Center Gage In Position Shown.

reason that in passing over the pulleys, air pockets will not be formed causing the belt to slip under heavy service.

The pulley on the line shaft is called the driver, while the one on the countershaft is called the driven. As "r.p.m." indicates the number of revolutions to the minute, no matter what pulley is referred to, we will mention one or two rules for determining the speed of pulleys, as well as to find the necessary diameter of a pulley to obtain a given speed to the driven.

**Problem A:** Having the revolution of the driver and the driven, also the diameter of the driven, find the diameter necessary for the driver.

**Rule:** Multiply the diameter of the driven by its number of revolutions and divide by the number of revolutions of the driving pulley.

**Problem B:** Having the diameter and revolution of the driver, ascertain the diameter of the driven to give a certain number of revolutions in the same length of time.

**Rule:** Multiply the diameter of the driver by its number of revolutions, and divide the product by the required number of revolutions.

**Problem C:** Having the diameter and number of revolutions of the driver with the diameter of the driven, find the required revolutions of the driven.

**Rule:** Multiply the diameter of the driver by its number of revolutions and divide by the diameter of the driven.

**Problem D:** Having the diameter of the driver and the driven, and the number of revolutions of the driven, what are the required revolutions of the driver?

**Rule:** Multiply the diameter of the driven by the number of revolutions, and divide by the diameter of the driver.

As to the speed of the countershaft, it will vary with the different manufacturers, but from 200 to 250 will be about the average. In case the shaft is already up and the speed established, it will only be necessary to arrange the pulleys to get the required speed at the machine.

The spindle cone usually has a couple of small, threaded openings into which are fitted screws, flush with the face of the pulley. These screws should be removed and a quantity of oil inserted and the pulley revolved by hand to determine if it turns free. In case it is tight and sticks, a little kerosene can be used to limber it up. The cone pulley should be watched closely while the lathe is new, particularly if it is to be used in connection with back gear, as it might become heated sufficiently to cause freezing, and this would result in either a scored shaft or a damaged bearing surface inside the pulley itself.

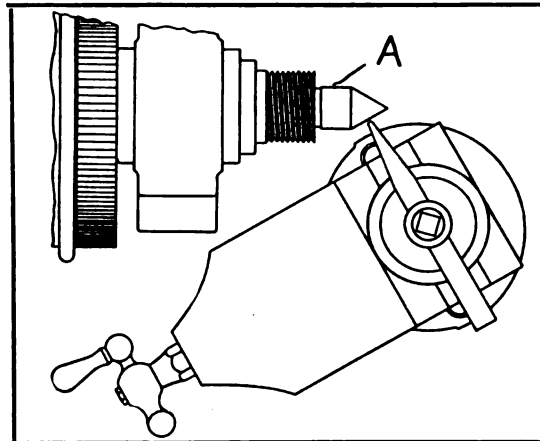


Fig. 3—To Machine Center, Remove Face Plate and Place Center in Head Stock as Shown at A.

Oil the lead screw and the lead screw nuts under the apron, being careful that the dust and excelsior are all removed. It is a very good plan to go over the lathe three or four times the first day after putting it into operation, to make certain that all the revolving parts are running smooth and free. The countershaft should be oiled

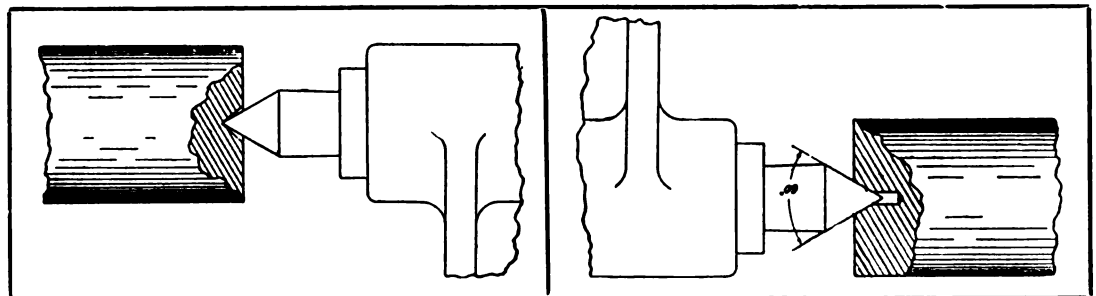


Fig. 4. The Incorrect Way of Centering.—Fig. 5. Proper Manner of Drilling and Reaming Center to Fit Tail-Stock Center.

Don't let any one fool with your lathe when it is not in use or it may be ruined.

Don't neglect to oil the live center when the work is placed between centers.

Don't expect the lathe tool to cut a clean, smooth cut when the tool is improperly set.

Don't expect a lathe tool to stand up under a speed that is too high.

Don't forget that something new can be learned every day about the lathe. Therefore never tell the customer, "I can't handle it," until you know and have tried.

Before attempting to machine a lathe center, first determine whether or not it needs machining, or "truing up," as we call it. To do this place the center gage, as shown in Fig. 2, and note the points at which it is off center.

To machine the center remove the face plate from the lathe and place the center in the head stock as shown at A, Fig. 3. Set the compound rest at a 60-degree angle and place a round-nose tool in the tool post. Take a very light chip, or just

Drill and countersink each end of the shaft until such depth is reached as to make a good strong bearing for the shaft. When this is done, place the lathe dog on the shaft and the shaft between centers, oiling the live, or back center, as the shaft revolves upon it.

Fig 4 shows the incorrect way of centering, or the way that will ruin the center. Fig. 5 shows the proper manner of drilling and reaming the center to fit the tail-stock center in such a manner that the bearing is perfect. Fig. 6 shows some different styles of drills and countersinks that can be obtained from the supply houses, which are ground to the proper angle for centering.

In Fig. 7 are shown two styles of lathe dogs that are in common use. At A, is what is termed the common lathe dog,

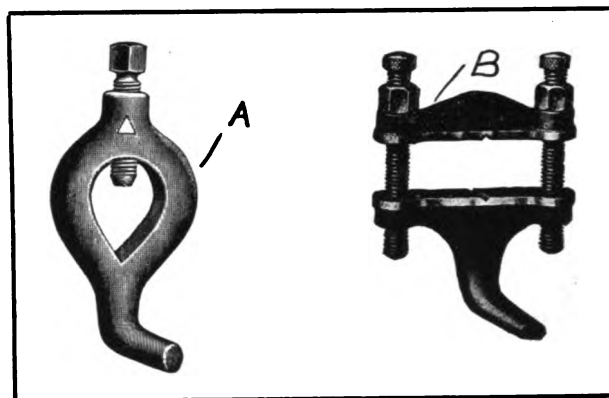


Fig 7—Two Styles of Lathe Dogs.—A, Common Lathe Dog; B, Clamp Lathe Dog.

In Fig. 8, are shown some of the patent tools that are used with much success and can be purchased from any tool supply house.

### Morocco Good Prospect for the Sale of Motorcycles.

There are in operation in Morocco about 600 passenger automobiles and about 50 motor trucks for the transportation of goods.

The use of motor vehicles is expected to increase greatly with the development of the system of roads in contemplation. In the zone of the French protectorate a system of roads is in an advanced stage of construction, and communications are good between the coast towns and the principal cities of the interior. A good macadamized road traverses the Tangier zone as far as the zone of Spanish influence, where roads are almost entirely lacking. There are now 1,287 miles of good roads and 353 miles of secondary roads in the country.

The class of automobile which has proved the most practical for traveling in Morocco is the light car of the cheap and medium grade. Up to the present time, the motorcycle has found no favor, although there is no particular reason why it should not be used extensively as the interior is traversed in all directions by caravan routes, which could be used for travel by motorcycle as well as cars.

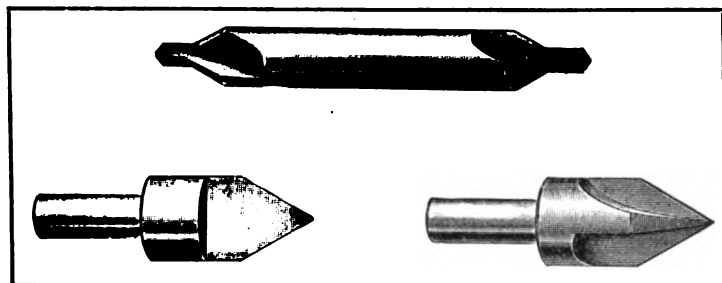


Fig. 6—Different Styles of Drills and Countersinks.

enough to make the center true, fitting the center gage as shown at Fig. 2.

In case the center to be trued is the tail-stock center, it will be necessary to anneal it before it can be turned. After turning, re-harden it and it is ready for use. Each time the lathe center is placed in the spindle or tail-stock, make sure that no dirt or oil is in it, but do not use the finger to try with. To clean the center opening, use a stick with a small piece of rag wrapped about it and revolve it with a little pressure. This will take up any oil that happens to be in it as well as removing all dirt.

When the shaft is to be machined between the centers of the lathe, the first thing necessary is to find and drill the centers to fit the shaft. Care should be taken that the point of the center does not bear against the bottom of the hole in the end of the shaft, or the point of the center will be ruined.

There are many ways of finding the center of the shaft but a very simple one is to scratch two lines on the shaft at right angles to each other, and where these lines intersect will be the approximate center. Place the center punch on this cross in the center of the shaft and tap it gently with the hammer. Place the shaft between the center and revolve it by hand and note if it runs true.

while at B is shown the clamp lathe dog which is adjustable to many sizes of shafts. Each, however, has its advantages and should be a part of the equipment.

The selection of a line of cutting tools is a matter of choice to a large extent. Some prefer the patent lathe tools, while some prefer the forged-steel lathe tools.

The patent tools have advantage of the forged ones inasmuch as there is no hardening and tempering to be done, for the cutting bits are made from high speed steel and need but to be ground to shape.

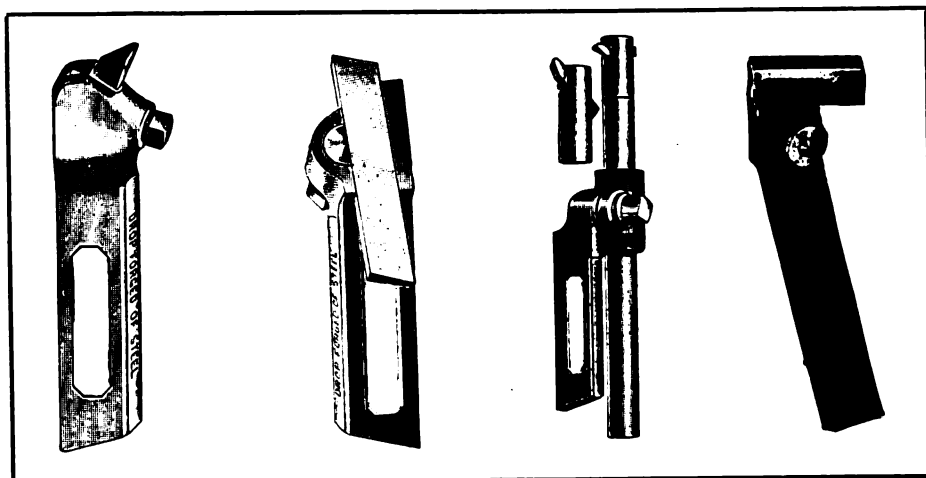


Fig. 8—Some Patent Lathe Tools Used with Much Success.



# Fundamentals in Battery Service

System in All Things Is the Foundation of Success in Any Business—Particularly Is This True in the Battery Business—A Well-Planned Tool-Kit Is One of the Simple Fundamentals That Will Help to Make Battery Service Pay

By C. H. Mark

As a battery service station proprietor, could an experience similar to the following happen to a customer of yours?

A car owner, attracted perhaps by your advertising stressing "superior service" stops in for a free test and some water.

Your "greeter" meets him in perfect manner, and quickly ascertaining his requirements, assigns a service man to the job. Customer apparently favorably impressed up to this point. But here the plot thickens.

The service man approaches the car empty-handed, perhaps, or carrying only a hydrometer and a jar of water.

A floor board or apron has to be removed to get at the battery. The service man has neglected to carry a screwdriver. Makes a trip to a far corner of the garage, obtains the tool and returns.

Takes the gravity reading, finds it O. K., but the battery is in need of water. Again he has forgotten the filling bulb. Another trip required. More lost motion.

Glancing at the terminals he notices a corroded positive terminal. That indicates a possible poor contact and need of cleaning. Soda solution and cleaning cloth, together with grease and grease brush are not at hand, so makes another trip to get these important parts of his service equipment. Additional lost motion.

Perhaps the service man now realizes that he may run into additional trouble on the job, so on this trip he returns to the car with a high discharge testing outfit, wrenches, etc.

In the meantime, the customer watches the operations with growing impatience—and finally, when the job is completed, he resolves "never again!" and disgustedly wonders how a concern rendering such service can exist.

Unfortunately the experience of that particular motorist is not uncommon. Statistics on the 40,000-and-odd so-called battery service stations in this country, recently

compiled, indicate that fully 50 per cent of them are conducted in such an unbusiness-like manner as to constitute a rank disgrace to the automotive industry.

The same figures show that by the same token 40 per cent of such stations barely deserve a right to exist. Only 10 per cent are really efficiently and successfully conducted.

The reason why more battery service stations are not in the "10 per cent class" is because they neglect to employ the fundamental vehicles essential to the render-

equipment in one place instead of a dozen, the service man saves untold lost motion and speeds up service.

2. Cuts down the loss of valuable tools and saves a big service expense item in the course of a year.

3. Customers are favorably impressed and become boosters instead of knockers of your service.

The kit-box should contain the following equipment:

1 hydrometer syringe, starting battery size.  
1 flushing bulb—the 6 oz. size.

1 portable high discharge testing outfit.

1 17-plate jar (for distilled water).

1 13-plate jar (for soda solution).

1 open end wrench — 3/16-inch by 1/4-inch.

1 open end wrench — 5/16-inch by 1/4-inch.

1 open end wrench — 7/16-inch by 3/8-inch.

1 6-inch gas pliers.

1 8-inch gas pliers.

1 ratchet socket wrench.

1 sealing nut wrench.

1 6-inch screw-driver.

1 12-inch screw-driver.

1 rat tail file.

1 wood rasp—12 inches.

1 hammer — light

weight, machinist's type.

1 wire-burnishing brush and cleaning rag.

1 pair end cutters, 8 inches.

1 can grease and grease brush, round.

1 8-inch adjustable wrench.

1 roll friction tape.

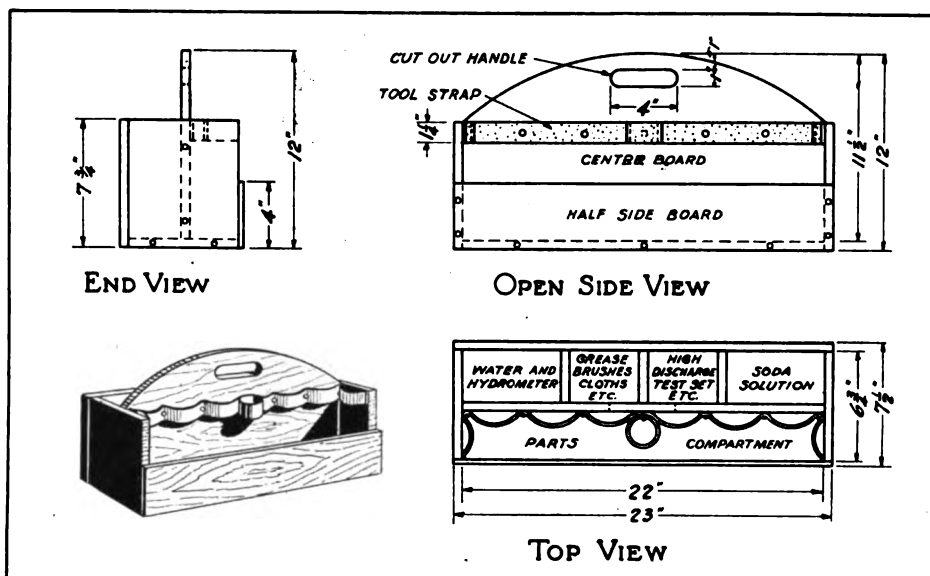
1 pair terminal tongs, for removing thimble type terminals.

2 pair pliers, thin jaws.

Various layouts for carrying the equipment will suggest themselves to the practical service man. In general, however, the closed side of the box is intended to carry the jars for distilled water and soda solution, high discharge test outfit, grease pot, brush, cloths, burnishing-brush, tape, etc.

The longer tools may be carried in the loops as shown in the open side. Screw-drivers, small wrenches, etc., may be kept in the compartment of the half-open side, together with a small assortment of gaskets, washers, cap-screws, vent plugs, etc.

(Concluded on page 40.)



A Battery Service Man's Well Planned Tool Box, Which Has Proved of Practical Value, with Details of Its Dimensions and Construction.

ing of 100 per cent service to customers.

Perhaps you have already guessed the cause of failure in the instance cited. The solution is to be found in the use of a well-planned service man's tool-kit, systematically kept and used.

Here is a practical suggestion to solve the problem. The sketch illustrates a kit-box, the value of which has been proved in practical experience. The box is made of maple, fastened together with wood screws, and painted with two coats of acid-proof paint. The tool strap is of mechanical rubber. Other information is as follows:

Height, overall, 12 inches. Height, case, 7 3/4 inches. Width, overall, 7 1/2 inches. Length, overall, 23 inches. Sides, 3/8-inch material. Ends, 1/2-inch material. Bottom, 1/2-inch material. Center board handle, 3/4-inch material. Partitions, 3/8-inch material.

By its use three points are gained:

1. By always having all of the required

# Welding, Cutting and Brazing Practice

The Ability to Grasp the Necessary Operations That Will Be Required for Every Job That Comes into the Shop Is More Essential in the Torch-welder's Trade Than Practice and Experience—Ways to Handle Certain Jobs

By David Baxter

In learning the torch welder's trade, as is the case with many older trades, it is not so much the experience and practice a man gets that numbers him among the truly skillful as it is his ability to quickly grasp the necessary operations that will be required for each job as it is brought to him—to quickly picture in his mind just what he must do and how to do it in order to produce a good piece of work.

Of course, he must be able, on top of this, to do the actual work—that is, he must be qualified by actual practice to do the things his mind plans. He may have done hundreds of different jobs and is thereby qualified to do the same kind of jobs again, but the time may come when he will be faced by a job he never saw or even heard of before. Then he can not depend upon experience, but must "figure the thing out in his head."

As has been stated, the welder's trade is the same as the other crafts in that respect. The mechanic may know as well as anybody how to light and regulate his torch; also how to manipulate it expertly. And he may understand heating and cooling in relation to expansion and contraction. In fact, he may know by heart all of the fundamentals of good welding.

Still he has not really learned his trade until he is able to "see" the new jobs. Then he should be able to "size up" a new job without referring to the precedent of other jobs. Some of the seemingly very difficult jobs will then appear ridiculously simple, and by the same token some of the innocent looking jobs will prove to embody a decided "kick," as the saying is.

The welding job described in this article is not quite so simple as it may appear at first. That is why it was endeavored to impress the welder reader with the idea that he should learn to study each job as it comes—to plan in advance what he would do to make it a success.

In describing the methods employed on this job, it is taken for granted that the reader understands the working principles of the oxy-acetylene torch process of welding. However, for the benefit of the novice, most of the details will be covered. To do this, it is best to start with the job as it came to the welding department.

First, the job consisted of a cast-iron manifold having one boltlug broken off and lost. There was also a crack some three or four inches long, extending back over the shoulder of the casting from about



Fig. 1—Preheating Arrangement, Also Location and Extent of Grooved Fracture.

the center of the missing lug. This crack was no doubt caused by the same accident that broke the lug.

The missing lug and the crack in reality made two jobs of this casting since each fracture was welded under a different system, separately—that is, the casting was preheated to weld the crack, while preheating was unnecessary when welding the lug. The crack weld was preheated to prevent the contracting weld metal from reopening the fracture or causing a new crack near the old one when the casting cooled.

The reason for not preheating the lug weld was that the new lug was built on with the torch a little at a time and, therefore, there was nothing to retard the contraction as the weld cooled; it would contract within itself, so to speak.

But to simplify the explanations, let us take the jobs separately and see just how each one was handled. First, the job of welding the crack and then that of building on a new bolt lug.

In the first instance, the casting was pre-

pared for welding by grinding enough metal out of the crack to form a groove its full length. This groove extended almost the full depth of the metal thickness, and at the inner end of the crack sloped gradually to the surface about an inch past the end of the crack.

The width of the groove at the top equalled about twice the measurement of the metal thickness. In other words, a V-groove with an angle of about 90 degrees was cut in the crack nearly its full depth. The grooving was accomplished by grinding on the corner of an emery wheel—the handiest and safest way. Then all rust and scale were removed from the outer and the inner sides of the casting in the vicinity of the crack.

The wide, deep groove was for the purpose of permitting the torch operator to weld the full thickness of the manifold, so there would be no weak or unfused portions in the bond. Then, too, the sloping sides permitted a deeper fusion, thereby strengthening the bond. It furnished more room to melt and mix the filler metal with the casting metal. The wide groove made a wider weld which is easier to keep free from slag or dross of any kind.

The rust and scale were removed to prevent any chance of their entering the weld during the melting process, as sometimes occurs, either in the shape of slag or in a gaseous state—either of these is liable to produce a weak, porous weld. This class of foreign matter also often causes trouble in getting the metals to flow into a solid mass. On a weld the size of this one, they are frequently trapped in the molten metal, since the weld melts and cools so rapidly there is no time to clean it sufficiently as the weld is made.

The next step of the crack weld was to arrange for preheating. The devices used in this part of the work were few and simple, as is clearly indicated in Fig. 1. They consisted merely of a common blowtorch, such as is frequently used for heating soldering irons, together with a number of pieces of fire brick for wedging up the casting. The bricks were used to bring the grooved crack somewhere near level and horizontal in order that the filler metal could be applied without so much tendency to run out of the groove.

The cracked end of the manifold was elevated in the manner shown in the illustration. Care was taken to see that the contrivance was fairly rigid, that it might

not slip or fall at a critical stage in the welding process. This illustration also shows the location and extent of the grooved crack.

The blowtorch was so placed that its flame would strike the end of the manifold, part of it entering the hole and part enveloping the cracked end of the casting. In other words, about five inches of the casting was enveloped in the flame of the blowtorch. This formed a simple and efficient preheater, by means which the temperature could be always under control, the heat being increased or decreased by the mere turning of a valve. The flame furnished plenty of heat to expand the casting without endangering it to overheating.

A common blowtorch, such as was used on this job, is a very convenient preheater for garage use, due to its portability and easy controlling feature. With it, a large variety of small castings may be preheated at small cost and minus the usual fuss and muss of some other forms of preheating. The flame may be localized or confined to one spot, or many be arranged to envelope a large part of the job. It furnishes a means of heating jobs to save welding gases where a regulation of expansion and contraction is unnecessary. And since it is nearly always included in the average garage equipment, the welder is put to no extra expense in purchasing a small preheater.

This manifold was preheated with the

blowtorch, the heat being maintained throughout the welding process. However, it could have been done just as well with an oil burner or with a natural gas flame. In the absence of either of these, it could have been heated with a charcoal fire, except that a special arrangement would be required to hold the fire around the end of the manifold. The manifold could also have been preheated on a forge if care was taken to keep the casting away from the direct action of the fire by placing it high enough above the fire.

The reason for preheating counts for more than the method, however. This may be explained in a few words. If the casting is heated enough to expand the metal before applying the welding flame, there will be no sudden strains of expansion caused by the intense heat of the flame when it is brought in contact with the groove. On the other hand, when the weld cools, it cannot shrink away from the casting as it contracts, providing, of course, that the casting has been properly preheated and allowed, or caused, to cool in unison with the weld.

The contraction of the cooling casting follows the contraction of the weld inward, so to speak. The strain being thus set inward, there can be no contraction cracks when the weld is cold. This is the main reason for preheating. Another feature is the fact that a weld is made easier and more rapidly on a red-hot job than on a normal one. It is obvious that the metal will melt sooner and flow better.

The action of the preheating on this manifold job, then, was to cause the cracked end to expand or stretch outward, thus spreading or opening the grooved crack, or we might say, increasing the diameter of that end of the manifold. When this diameter decreased as the weld cooled, it closed in conjunction with the shrinking of the weld which became smaller as it cooled.

When the preheating devices were arranged as shown in Fig. 1, the blowtorch was started and its flame directed as stated. A few pieces of asbestos paper were then spread over the heating end of the casting to confine and thereby hasten the preheating. As soon as the whole end of the manifold became dull red, the welding flame was applied.

It was brought in close contact with the inner sloping end of the groove where it was slowly revolved in decreasing circles, to concentrate in one spot at the end of the groove as it started to melt. The filler rod was then placed in contact with the flame and melting weld. As soon as it started to melt, the rod was pushed into the molten weld to melt and fill a small portion of the groove. During the filling process, the tip of the white welding flame circled over the melting zone and then up and down the end of the filler rod to bring both to the fusing stage at once.



Fig. 3—The Newly-Welded Lug in the Rough Before Grinding.

As the groove filled, the process slowly moved to another portion of the weld. Here the flame was kept revolving over the groove and filler until they melted together, again working onward as the fusion was completed. Thus the groove was filled a little at a time. With each filling a small surplus was added to the top of the weld, smoothly rounded and melted in along the edges.

During this filling process, the operator was careful to melt the bottom as well as the sloping sides of the groove as he went along. To leave an unconnected spot in the bottom or side of the weld would furnish an opportunity for two sets of contractions to act against each other and result in an internal strain and, perhaps, an open crack.

The edges of the weld along the groove at the surface of the casting were also the recipient of considerable attention. The welding flame was played along them until the added metal, and that of the casting, settled into one mass. At times, the position of the torch was changed to cause the flame to strike the weld at an angle in order to guide or blow the metal about at the will of the operator. In this way, he could, with the assistance of the rod, level the high spots and fill any low portions to make a smoother appearing weld.

If the welder is fairly experienced, this smoothing may be done as the weld is made. If not, he may work back over the

(Concluded on page 40.)



Fig. 2—The Device for Building on the Missing Lug.

# Practical Hints for Shop Mechanics

## Scale-Removing Solution.

The hard scale left on castings is exceedingly injurious to the lathe tool, and should be removed. This can be done with a solution made of one part sulphuric acid to 30 parts water.

That portion of the casting which is to be cleaned should receive a coat of this solution at intervals for a period of 12 hours, and then should be followed by washing with water. This process will dissolve the iron beneath the scale and the scale may be washed away.—S. G., Ill.

\* \* \*

## Patching Wires.

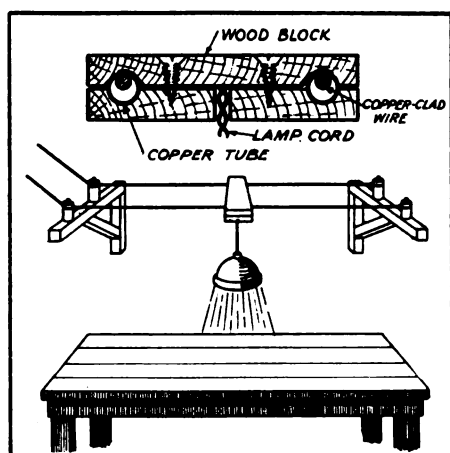
Wires frequently develop small exposed places, on which tape does not seem to stay put. It is not always convenient to replace such wires altogether and the following method of patching may prove helpful:

Dip a length of thread in shellac and then wind it very tightly around the bare spot. Continue layer on layer until the repair is a little larger than the insulation. Finally, put a layer of shellac on the finished winding to serve as a sort of thread. This makes an oil-tight repair which is comparatively permanent.—L. A. Cal.

\* \* \*

## Garage Light.

It is often necessary when working at night, or on a dark day, and especially in radiator work, to have the light close to your work. So you have to tie the cord to something near. Then you start across the room for something and trip over the



Convenient Adjustable Garage Light.

cord. Oh, it's a nice feeling all right, but I don't like it so I tried a light sliding on a wire. Then there was always a bunch of wire hanging in the way, so I finally hit on the scheme shown in the accompanying

## ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

Two copper-clad steel wires are strung parallel about eight inches apart on insulators fastened to wooden supports. On the two wires, which are drawn very tight in order that they may not sag, slides a block, to which is fastened the lamp socket and bulb in a Ford headlight reflector.

The two steel wires carry the current and the current is taken from them by the two little copper tubes which are, of course, clamped in the two blocks. The cord should be long enough to be adjustable to any height between the bench and wires.—R. I., Kans.

\* \* \*

## Test for Piston Rings.

When there is an escape back past the piston rings of hot gases, the crankcase inevitably gets warm. On the other hand, if the escape is past the valves, this condition is not found.—D. P., Mich.

\* \* \*

## Slow Leak.

When the small rubber cushion in the base of a tire valve is displaced in any way, it is apt to depress the small core stem of the valve so that a slow leak results, which the driver usually blames on a tiny puncture.—P. D., Mich.

\* \* \*

## Battery Readings.

Battery readings with the hydrometer should be taken before distilled water is added to the solution, which will otherwise be diluted and a wrong reading given. After water has been put in, it takes some time to mix with the acid. As the water is lighter, it stays on top, and if the hydrometer is used, say an hour after the water has been added, the hydrometer will take up only a weak solution which is not the real one.—L. A., Cal.

## Use for Oil Tins.

The tin cans that commonly contain the better brands of oil may be cut up into a variety of useful things. By cutting the tin diagonally across, a small shelf and drip pan may be made. A wall tray is also easily made, likewise a dustpan, to which a handle may be attached.

An oil can holder is easily devised with a drip pan, made by the use of a sheet of perforated tin, and is an extremely useful accessory. It saves much dirt around the garage.—T. K., Ga.

\* \* \*

## Grinding Valves.

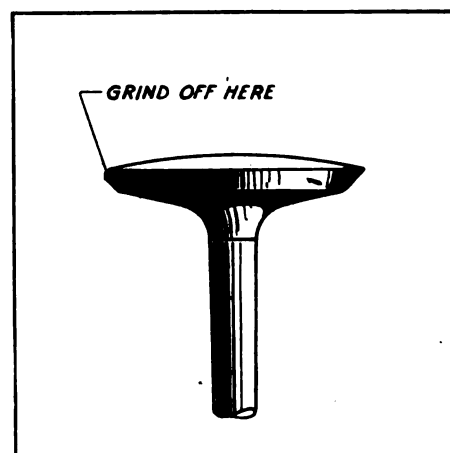
Valves can be very easily and very quickly seated by simply putting them in a drill press or lathe and filing the seat down as shown in the accompanying illustration before grinding them in. We have found this not only a great time saver, but a very accurate and efficient way of grinding in valves.—H. A., Wis.

\* \* \*

## Removing Ford Axle Gears.

Ford gears may be removed from the back axles by using two pieces of iron pipe. Select one piece of pipe, 1½-inch size, about six inches long, and another 1¼-inch size and 36 inches in length. Hold the short pipe just below the gear and it will be found to fit just inside the gear teeth. Now bunt the end of the pipe against the anvil until the Whitney key can be removed. Then slip the long piece of pipe over the axle and ram against the anvil until the gear comes off.

Care should be taken that a piece of waste or rag has first been placed in the end of



Efficient Way of Grinding in Valves.

the pipe so that the end of the axle shaft will not be damaged by striking against the anvil. The same pipes can be used in reverse order when you are ready to replace the gears. This will be found a timesaver.



### Steel Towing Skid.

When inconvenient to bring home with a towing truck a car that has had its rear wheel broken, a simple steel skid may be used.

This skid, or sled, can be made of a steel runner about 6 ins. wide and 2½ ft. long, on which is mounted a wooden block. It should be placed beneath the brake drum of the broken wheel, and with a chain can be connected to the front spring shackle.—S. G., Ill.

\* \* \*

### To Cure Squeaky Springs.

In cases of chronically squeaky springs, jack up the car so that the weight is removed from the springs and then soak the latter with kerosene.

Run the car for a day or so to let the kerosene soak in and then saturate the springs with some of the old oil that has been drained from the crankcase.

After a day's run, wipe off any excess oil that shows to prevent the collection of unseemly dust.—A. W., Nev.

\* \* \*

### Greasing Universal Joint.

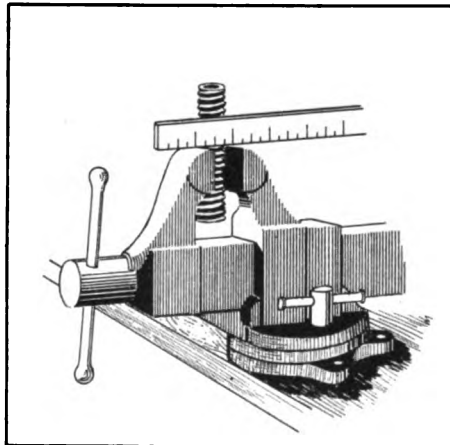
To facilitate the filling of the grease cups for the forward end of the universal joints, which are under the floor-boards, drill four holes through the floor-board directly over the grease cups. Connect the holes with saw cuts, when that section of the board will come out.

A slightly larger section should be cut from the rubber mat and four sections of sheet metal are screwed on the cutout block under the section of rubber. This makes a sort of lid which may easily be lifted out to permit access to the grease cups beneath.—L. A., Cal.

\* \* \*

### Using a Vise for a Caliper.

Many times in shop work it is desired to know the distance from one side to an-



Use of a Vise in Measuring.

other of some part which is so irregular in shape that it cannot be easily measured with a rule.

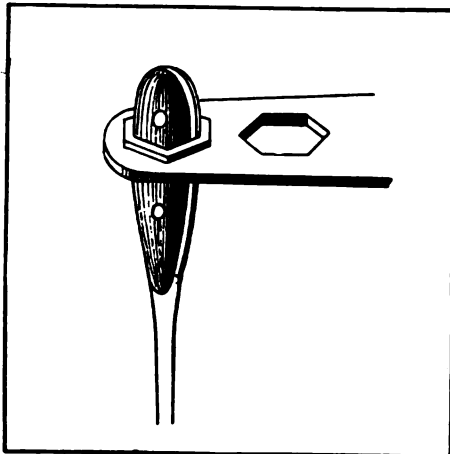
If a vise, which is not much worn is at hand, the part may be quickly measured.

The piece is placed between the jaws of the vise, then measurement with a rule is made between the faces of the vise jaws. This will be accurate enough for most practical purposes.—R. W. T., Mo.

\* \* \*

### Use of Screw Driver.

Very often one will find it hard to turn the wood screws which hold the fenders to the body with just an ordinary screw



Screw Driver with Added Leverage.

driver. To obtain more leverage, use an ordinary wheel wrench, one from a Ford, Chevrolet, Hudson, or almost any make of car, hammered tight on the handle as shown in the accompanying sketch. This works better than anything I have tried for this work and any similar work which requires considerable leverage.—E. C. P., Ill.

\* \* \*

### Detecting Poor Mixture.

The color of the flame of combustion indicates the mixture of gasoline and air that is being used. To see this requires an open priming cock on one cylinder while the engine is running, and it can best be seen in the dark or at any rate, dusk.

An orange-colored flame indicates too rich a mixture. A pale yellow indicates too lean a mixture. A pale blue flame is slow speed, merging into purple and then almost transparent shows that the mixture is right.—B. S., Pa.

\* \* \*

### Top Mending.

To mend a tear in the top, use woolen yarn to draw the edges together, after which apply a piece of material similar to that of the top with rubber cement set by the vulcanizer.—R. S., Ark.

\* \* \*

### Cleaning Valves.

When grinding-in valves it is a good plan to clean the stems of all foreign matter and make them bright and shiny. Better valve action will be had if these parts are kept in good condition.

A good way is to clamp the head of the valve in a vise between two blocks of wood and wrap a narrow strip of emery paper around the stem. Pull the strip

back and forth; at the same time move it up and down the stem, but be careful not to score the metal by pulling the emery cloth too tight. Wipe the head clean of all particles that might fall down on it, before putting the valve back in the cylinder.—D. P. Mich.

\* \* \*

### Emergency Carbon Brushes.

The small carbon rods which are part of the ordinary pocket lamp battery can be filled and trimmed down to make a very acceptable temporary replacement for worn-out carbon brushes in the magneto.—K. G., Ind.

\* \* \*

### Removing a Wheel—Not.

Of all the fool stunts I ever heard of, the following seems to be the limit. A self-styled mechanic after sledging the axle trying to remove a rear wheel, fastened a No. 10 galvanized wire to a "flivver" and expected to remove it by a steady pull. Did he succeed? He did not.—B. C. W., S. C.

\* \* \*

### Cracked Water Jacket.

A cracked water jacket may be easily mended in the following way:

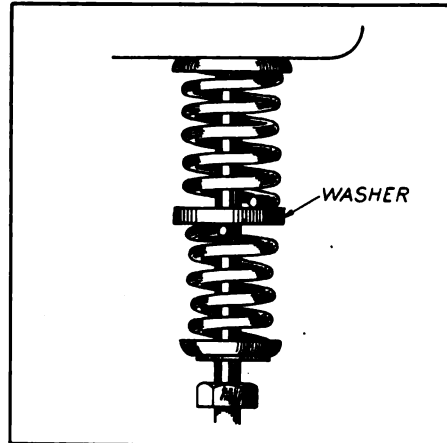
Drill a small hole at each end of the crack and tap it for a small copper plug. Next scrape the surface near the crack until the metal is bright. Cover the crack with soft copper filings and melt then in with a blow torch. Use a flux of rosin dissolved in alcohol.—A. T., Cal.

\* \* \*

### Valve Spring Repair.

In overhauling a gasoline motor, one often finds broken valve springs. Often the spring is not carried in stock and the owner wishes to use his motor. We find that a temporary repair can be made as follows:

Select an iron washer which will freely slip over the valve stem and separate the



Temporary Repair of Valve Spring.

two pieces of spring with the washer. This will keep the spring from telescoping as it otherwise would do and will permit the engine being used until the new spring can be obtained.—R. W. T., Mo.

# Readers' Questions and Answers

## Using Speedometer on Speedster.

Using a Standard speedometer built for a motorcycle (80 m. capacity) what size road gear—i.e., number of teeth—also what size pinion are required for a 30-inch wheel? Also what size road gear and pinion would be right for 30-inch wheels and a Stewart motorcycle head? We are building a speedster and want to use this speedometer if possible.—R. B., Mont.

The first part of your question is not very clear. We understand that you have a standard motorcycle speedometer (Stewart) and would like to use it on a speedster that you are building. Is this right? If so, send us the size of tires which will be used on the front wheels of this car. Tire size is required not wheel size. We do not know what you mean by a Stewart motorcycle head.

\* \* \*

## Third Generator Brush and Starter.

1. Please tell me how to regulate the third brush on the North-East generator which is used on the Dodge car? Also how to tell how many amperes it is charging.

2. Please explain how the impulse starter on a high tension magneto works, how to care for it, and what to do if it should fail to work.—G. M. S., Kans.

1. The small screw which is located in the rear end of the generator, is connected to the third brush by a rack and pinion movement which allows the position of the brush on the commutator to be changed slightly. This rack and pinion can be seen by removing the cover over the brushes. Turning the screw mentioned in a clockwise direction, increases the output for a given speed, while turning it in the opposite direction decreases it.

The generator is in normal working condition if an ammeter shows a charge of about 12 amperes when running at an engine speed equal to 15 miles per hour on first starting and about six amperes on becoming warmed up.

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

To tell how many amperes it is charging, connect an indicating ammeter—that is, one that shows the number of amperes the generator is charging, graduated from one to 15 or 20. The Weston ammeter, Westinghouse, or an ordinary automobile ammeter which shows the number of amperes charge, or discharge, is suitable for this testing.

2. Attached to the armature shaft of the magneto is a dish-shaped flange, carrying two cams on its circumference, *A*, in the accompanying illustration. (This is the Bosch impulse starter; they are all about the same in principle and operation.)

Forming an integral part of the impulse starter driveshaft is a cross member, *H*, the square ends of which fit into the openings of the dish-shaped flange mentioned.

This latter member "floats" on the spiral springs, *C*, which are held in circular form

and are secured to the starter shaft, which also is the main drive shaft.

Located above these several members is a latch forming part of the external engagement lever, *E*. When so desired, this latch is held up or kept free from the circular cam by a trigger, *D*.

When the latch, *F*, is permitted to drop by releasing the trigger, *D*, and the starter or coupling shaft is revolved, the latch holds the crossbar, *H*, from turning and thus the springs are compressed.

Since the crossbar is held stationary, the magneto armature, *B*, does not revolve.

By removing the external engagement lever, *E*, toward the "release" position, the latch is raised and the crossbar is released. The springs held in compression now being freed, the impulse starter is thrown out of operation.

It can be seen that when the engine begins to operate, the speed at which the coupling cams strike against the lever is sufficient to cause it to fly up out of position where it is held secured by the trigger.

It should be noted that the coupling or starter cams are situated so that the release occurs after the piston has started on its downward stroke. Thus no back fire or back kick is possible.

To put the starter into operation, the lever, *E*, situated on the front of the starter housing located at the driven end of the magneto, is moved over as far as it will go in the direction marked "engaged."

As long as the lever is not pushed to the release position, the impulse starter will function and an intensive penetrating spark will be delivered to each cylinder consecutively until the engine starts and takes up its normal cycle of operation.

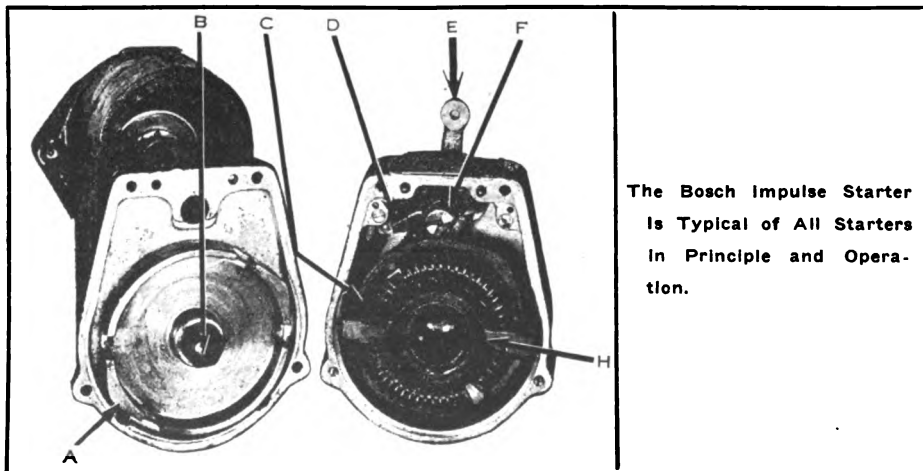
As soon as the engine starts and exceeds a speed of 150 r.p.m., the impulse starter automatically ceases to function. The impulse starter requires no attention with the exception of a few drops of oil every four or five weeks through the oil cup over the driving shaft.

\* \* \*

## Place for Repair Shop.

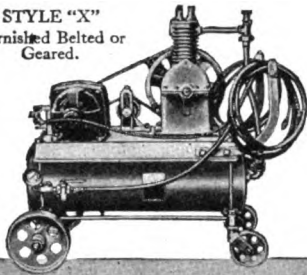
As a subscriber to your publication, I would like a little advice as to the planning of a prospective garage and repair shop. I have been the proprietor of a very successful automobile repair shop for six years and am now planning to branch into the garage business. I own the two-story building in which my repair shop is located and plan on utilizing the second floor space as the storage room. Is my idea correct and efficient? Please publish an answer in your next issue.—H. T. D., Va.

Your plan is decidedly erroneous. If your repair shop is to be operated in connection with the garage business and on

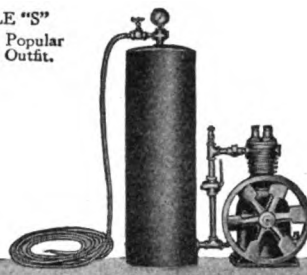


The Bosch Impulse Starter Is Typical of All Starters In Principle and Operation.

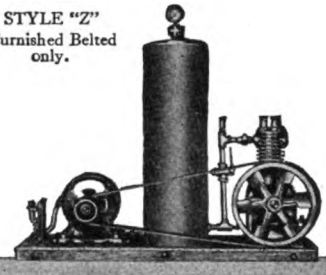
STYLE "X"  
Furnished Belted or  
Geared.



STYLE "S"  
Simple, Popular  
Belted Outfit.



STYLE "Z"  
Furnished Belted  
only.



The Curtis Sign is 10x14 inches—baked enamel on steel. It is furnished FREE with every Curtis Garage Air Compressor and cannot be obtained in any other way.

**FREE**  
**CURTIS AIR**  
**FREE FROM OIL**

## Conserve Your Patrons' Tires

Motorists will go a long ways to find the Curtis Sign and get Curtis Air—FREE FROM OIL—because it means less blowouts and greater tire mileage.

# CURTIS Air

## ~ Free From Oil

Because of correct design and good construction, Curtis Garage Air Compressors are dependable and operate with minimum power. The patented and exclusive self-regulating splash oiling system prevents oil from getting into the air line. The air is pure, clean, safe and FREE FROM OIL.

### OTHER CURTIS FEATURES

Fan flywheel cools cylinder. Valves of light weight and large area. Hand unloader permits starting against full tank pressure without injury. Large drop-forged crank shaft. Adjustable, renewable, die-cast, non-cutting bearings. Head removable without breaking pipe connections—only one gasket.

### MADE IN VARIOUS SIZES

Curtis Compressors are made in various styles and sizes to suit your special needs. Write today for illustrated literature giving full particulars. Use the coupon.

### CURTIS PNEUMATIC MACHINERY CO.

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Curtis  
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St. Louis, Mo.

Gentlemen:  
Please send me full details  
on Curtis Air Compressors—  
your proposition and prices.

Firm Name.....

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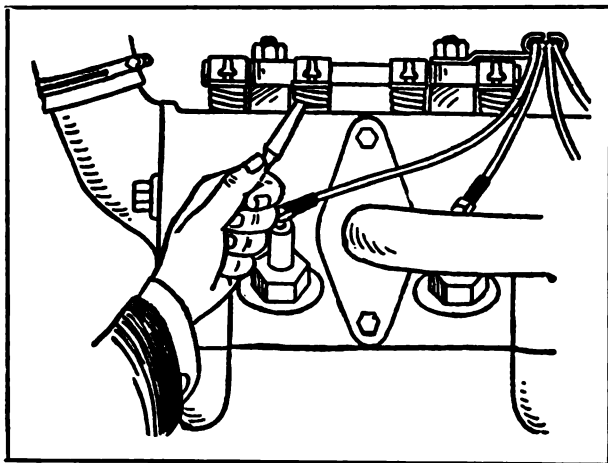
Jobber's Name.....

Address.....

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

the same premises, it should be located in the second story; the garage should be on the ground floor. This is advisable for several reasons:

In a two-story building, such as you own, your best light will be on the second floor and this is essential for repair work. Again, there is much more moving of cars about in the storage room than in the repair shop and this is best accomplished on the ground floor. There is also better opportunity for the workmen to do more efficient work on the second floor than on the first, due to absence of near noises.



Increasing the Tension of the Valve Spring.

### Jerk in Chevrolet.

I have a 1916 Baby Grand Chevrolet in my shop that has a peculiar jerk in it. This jerk comes between six and nine miles an hour. This car works fine and anything above nine miles she does as good as ever.

Five or six mechanics have tried to clear up this jerk and all fell down. All cars of this model that I know of have this trouble. Can you tell me the cause or is this a peculiarity of this car? This is

what has been done in order to get rid of the jerk:

Four new spark-plugs put in; new coil put on; new distributor put on; new wire run from battery to switch; valves ground and carbon cleaned; new Inland rings put on pistons; lost motion in drive shaft taken up; new Zenith carburetor put on; intake manifold examined for leak, and about everything else one could think of.

Do you think one of the new parts that has been tried out is defective or what is the trouble? The engine seems to miss when the jerk comes.—W. O. C., Pa.

The jerk you refer to comes as a result of one of the cylinders misfiring at the speed to which you refer, and is probably due to a weak exhaust valve or a leak in the intake pipe or connections.

The valve springs are subject to considerable heat and it follows that in time their temper will be affected. Many mechanics overlook the valve springs and consequently poor operation at low speeds is never corrected or so-called tappet noises still tap after the tappets are adjusted when in reality they are valve slaps.

By inserting a screw driver or other suitable tool between the coils of the spring, see illustration, and turning it while the motor is running, the tension of the spring can be increased. If the motor picks up and runs properly, the spring is causing the trouble and should be replaced.

The factory says that a common cause of missing, which results in jerking at low speeds, is a leak in the intake pipe or connections and that is best detected by allowing the motor to run idle at the missing

speed. Take a squirt-can full of gasoline and squirt around the intake pipe and connections. If any gasoline is drawn in, it indicates the leak and the motor stops to misfire.

\* \* \*

### Garage Lighting Facilities.

What do you recommend for lighting facilities in an up-to-date garage? I am just completing electric wiring plans for my new 100 ft. by 150 ft. garage and service station.—C. H. M., Ky.

Your illumination problem can be divided into two classes, that of general and that of individual lighting. In the repair shop, the illumination should be approximately 120 candlepower per 200 square feet. Where there is additional lighting as drop lights to carry to the cars and individual lamps at vises, general illumination allowance of 100 candle power per 300 square feet will be quite sufficient.

If your service station is to be equipped with a machine shop, there should be a general illumination allowance of one candlepower per square foot, while the individual lights should be at least 50 candlepower per tool doing accurate work.

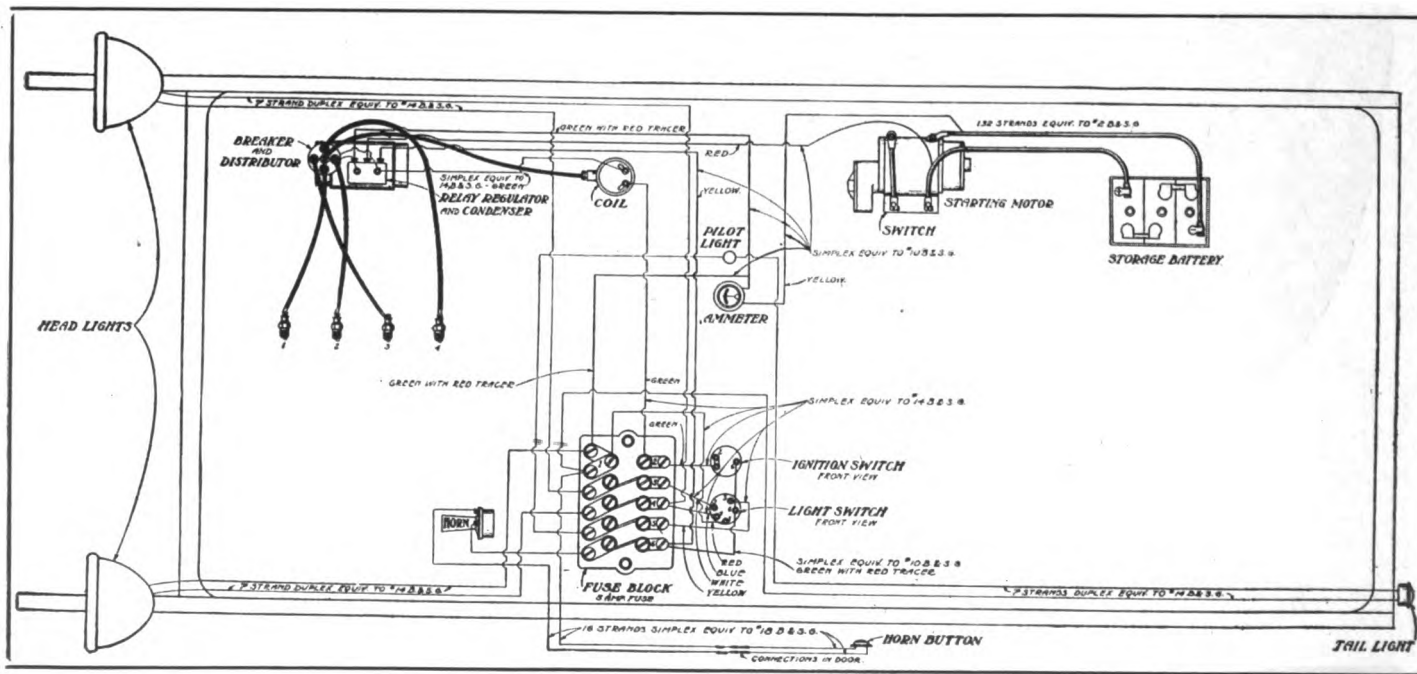
It is a poor policy to economize on the amount of illumination, for such is usually done to the detriment of the workmen's eyes, resulting in deficient work turned out by the shop.

\* \* \*

### Reo Wiring Diagram.

Will you please publish in your next issue a wiring diagram of the 1916 Reo 4-cylinder car? What is the S. A. E. horsepower rating of this car?—M. M., Ala.

The wiring diagram asked for will be found on one of the pages in this department. The S. A. E. horsepower rating of this car is 27.23.



The Wiring Diagram of the 1916 Reo Four Cylinder Car.





## Tire Protector That really Builds Business for You

The cost of driving a car is rapidly increasing. The price of gasoline is advancing. Tires cost more. Everything incident to the operation of an automobile is getting more expensive.

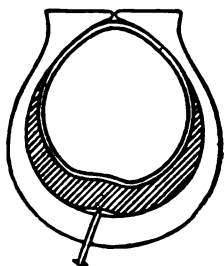
The net result eventually will be less promiscuous driving of motor cars—not fewer cars, possibly, but more careful conservation all along the line in the use of automobiles.

This condition is bound to react against all who sell tires and accessories, unless something can be done to counteract these rising costs.

The Coffield Tire Protector enables you to render a real service to your customers in reducing tire costs. The Coffield reinforces the tire, protecting it against road bruises, punctures and blow-outs, and enables it to deliver a greatly increased mileage.

The Coffield Protector is made of pure, live, rubber, **without fabric**, thus eliminating chafing and heat due to friction. It is really an integral part of the tire itself; and it has all the advantages of similar products, with none of their objectionable features.

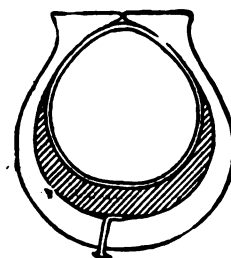
Let us explain to you in detail how we can help to increase your profits, gain more satisfied customers, and insure your tire business against a possible slump in the future, by handling the Coffield Tire Protector. We have an interesting proposition for dealers.



The nail goes thru the outer casing.

# The COFFIELD TIRE PROTECTOR COMPANY

## DAYTON, OHIO, U.S.A.



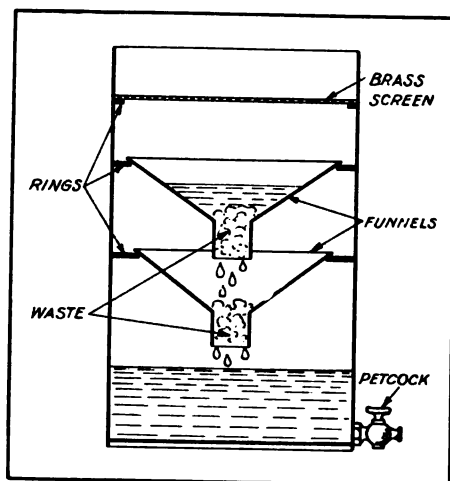
But the live rubber of the Coffield Protector (having no fabric) merely gives when the nail strikes it — and the nail clinches between the Protector and the casing.

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisements.

### Utilizing Dirty Oil.

I am a garage-owner and have a great deal of repair work. It seems to me there might be some practical use for the dirty oil drained from a motor crankcase. It, of course, cannot be used in the crankcase again. Can you suggest some method for utilizing this dirty oil in one of your future issues?—E. M., Ind.

There are many occasions when oil drawn from a motor crankcase or sump, still possesses lubricating qualities but is unsuitable for use again in the crankcase, owing to the presence of dirt. However, just as you suggest, this oil still possesses



Simple Filtering Device.

sufficient lubrication value to be used around the unimportant bearing points of the car to which it can be applied with a hand oil-can.

Thus, instead of throwing away the oil, by use of the simple filtering device shown in the accompanying illustration, it is possible to save several gallons in the course of a year. This may be made up by any tinsmith at small cost. It consists of a main container of galvanized iron having a tight-fitting cover so dirt will not get into it. Three ledges are riveted to the sides of the tank as indicated, the one at the top holding a brass wire gauze screen, and the two lower ones acting as supports for funnels.

The discharge opening of each funnel is filled with clean waste, and by the time the oil reaches the bottom of the container, it has been thoroughly filtered, the larger particles of dirt being restrained by the brass screen, while the remainder is held by the waste plugs. A petcock should be soldered to the bottom of the tank so the filtered oil may be drawn out as needed.

\* \* \*

### Abnormal Gravity Reading.

Will you please publish in the next issue of your paper some information as to why the storage battery in my car constantly shows a gravity reading of over 1.300?—A. A. J., Mich.

Such a specific gravity reading is cer-

tainly abnormal. It is very evident that there is an excess of acid in your battery. Prompt reduction of the acid proportion is necessary.

\* \* \*

### Firing Order of Marion.

What is the firing order and model of a Marion car No. B, 54,427?—W. A. P., Pa.

The firing order is 1-3-4-2; it is a 1915 model.

\* \* \*

### Pulley for Driving Air Compressor.

I should like to know what size compressor pulley is necessary to drive an air compressor at a speed of 400 r. p. m. I have an electric motor with a three-inch pulley which operates at 2,000 r. p. m.—K. F., Ill.

To determine the size of the compressor pulley, multiply the speed of the motor by the diameter of the motor pulley; divide this result by the number of revolutions expected of the compressor. In your case, the size compressor pulley to use is obtained:  $2000 \times 3$  equals 6000; divided by 400 equals 15 inches, the diameter of the pulley on the compressor.

\* \* \*

### Polarity of Wire Terminals.

I would be greatly obliged to the AMERICAN GARAGE & AUTO DEALER if you will send me some method for testing the polarity of two wire terminals. I have found it necessary many times to know the positive and negative pole of a battery when charging. Can you publish this item in an early issue of your journal?—H. T. V., Ind.

One of the simplest methods for determining the polarity of the terminals is to peel the skin from a potato and place both terminals on the potato as shown in Fig. A of the accompanying diagram. At the positive terminal a green spot will appear.

If a beaker is filled with acidified water, Fig. B, the negative terminal is apparent by having the most bubbles around it. Special pole-finding paper is sometimes used, color being the determining item. Still another method employed is to fill a glass tube with liquid. The action of the

current discolors the liquid at the positive terminal as shown in Fig. C.

\* \* \*

### Gear Ratios.

What is the gear ratio of the following cars: Buick, Chevrolet, Chalmers 48, Grant, Reo, Haynes and Hupmobile.—S. E., Ind.

The gear ratios are as follows:

Buick, 3.77 to 1.

Chevrolet, 4 to 1.

Chalmers 48, 4 to 1.

Grant, 4.5 to 1.

Reo, 4 to 1.

Haynes, 4.07 to 1.

Hupmobile, 4 to 1.

\* \* \*

### Tracing Magneto Trouble.

I would like to have you give me some information as to how to trace magneto trouble.—K. F., Kan.

All magneto trouble is traceable to one or more of three sources: The spark-plugs, the current generator, or the transformer coil. In cases where only one cylinder is firing irregularly, the fault is quite apt to be with the spark-plug in that cylinder.

When the ignition fails suddenly, the trouble can most often be traced to a short circuit in the grounding cable which is connected to the nut on the magneto contact breaker. This grounding cable serves for switching off the ignition.

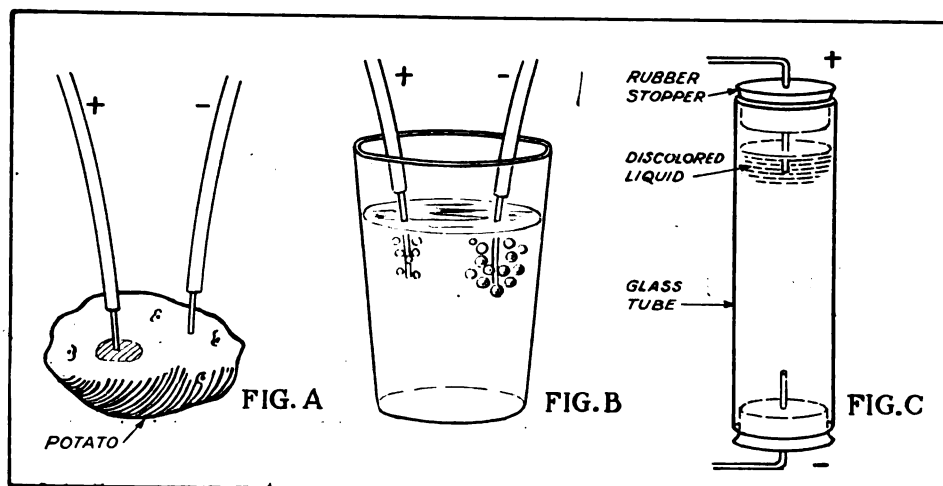
If the motor still works irregularly and the perfect working order of the cables and plugs is assured, the trouble is doubtless in the magneto, providing it is an ignition fault.

\* \* \*

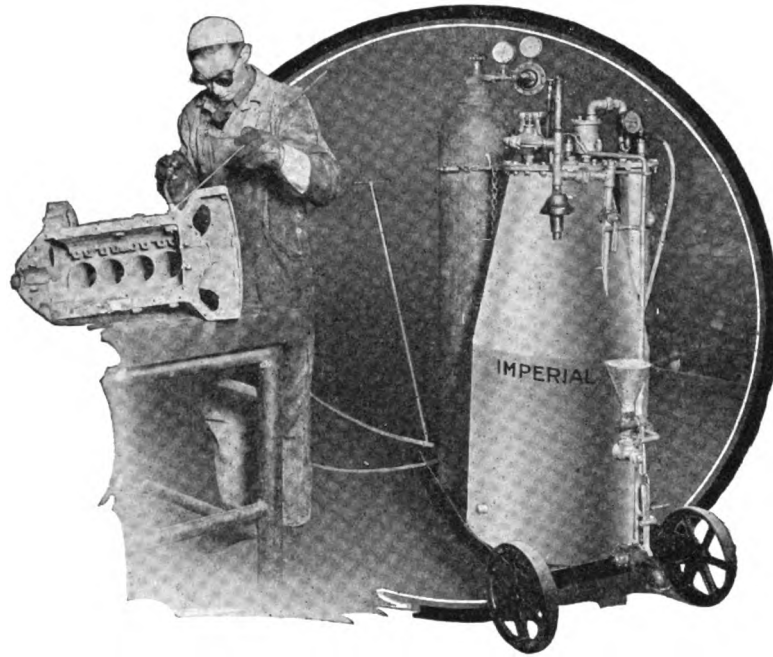
### Lightest Weight 6-cylinder Car.

Please give me the name of the lightest weight six-cylinder touring car made in this country. Where is it made?—K. T., Mo.

The weight of the lightest six-cylinder touring car is 2,330 pounds. It is the Oakland-Six, manufactured by the Oakland Motor Car Co., Pontiac, Mich.



Test for the Polarity of Wire Terminals.



**R** EPAIRS you could not possibly make before are easy tasks with Imperial Welding Equipment.

This winter when fewer cars are running, you can attract money making repair work of all kinds if you have an Imperial Welding Outfit equipped with an

## **Imperial** Automatic ACETYLENE GENERATOR

This generator may be attached to any make of welding equipment and makes acetylene—the vital fuel in welding—for 2 to 5 cents cheaper per cubic foot than you can buy it. Automatic in operation, generation starts when torch is lighted and stops when extinguished. So even is the pressure no regulator is required.

It's simple to operate an Imperial outfit. And there's a size just right for your garage. Write for free catalog and full information.

# **The Imperial Brass Mfg. Co.**

**1224 W. Harrison St.**

**Chicago, Ill.**

## Welding, Cutting and Brazing Practice.

(Concluded from page 31.)

finished weld to smooth the rough spots. In any event, however, he should be careful not to burn the metals by too ardent application of the flame—that is, he should not hold it too close to the molten metal, nor too long motionless in one spot. If he does, he is liable to force oxygen or acetylene into the metal, or maybe both, thereby causing it to be brittle or porous. An almost constant movement of the welding flame tends to eliminate most of the danger. The other extreme is that he is liable to cause a poorly connected joint if too cautious.

A strictly neutral flame was employed on this job, which, if properly manipulated, is not liable to either oxidize or carbonize the weld. A soft silicon cast-iron filler rod, a quarter inch in diameter, was the filling metal. This size together with a little over-medium size welding tip form a combination that is perhaps a trifle too large for the novice, since the flame will supply quite a lot of filler metal from a rod of this size. By using the over-size tip, the welder was enabled to fill the groove entirely as he went along, thus making it unnecessary to reopen the weld to add a second layer, which might have been the case with a small rod and tip.

When the welding was finally finished to where the groove cut through the broken lug, the heated end of the manifold was swathed in asbestos paper for slow cooling, the blowtorch being cut out. Then the job was permitted to cool until it would no longer burn the moistened finger tips. It was then ready to arrange for the lug welding which was commenced before the casting was entirely cold.

The manifold was once more placed upon the fire bricks, but this time it was placed horizontal with the broken lug end flat upon the smooth clean surface of a fire brick, the position indicated in Fig. 2. But before placing the manifold, the smooth brick was polished with a mixture of graphite and oil—that is, the portion beneath the missing lug was coated with the graphite mixture.

This was done to prevent the molten iron from clinging to the surface of the brick; also for the purpose of lending a smooth surface to the lower side of the lug, since the new lug was to be built in sections across the brick. The operator was careful that the brick was level with the face of the opening in the manifold.

No preheating was employed on the lug building since there was nothing to retard the action of contraction. The metal of the new lug, when attached to the manifold, could move in and out with the action of heating and cooling. As the new metal was added, it was free to expand outward—to literally push itself away from the manifold. Then as it cooled, it could draw within itself, so to speak, toward the casting.

The remaining heat of the previous weld prevented any sudden expansion when the welding flame was first applied.

The same torch, again with strictly neutral flame, was employed to build on the lug; also the same kind and size filler rod was used. The manipulation of both was practically the same as on the crack weld, in regards to movement and melting, except that larger quantities of filler were melted after the first connection to the casting.

First, the edge of the broken lug that remained on the manifold was melted down with a ridge of filler metal added to it the full length of the break. To this ridge, another was added the same size and both were melted flat upon the graphite-coated brick. The new metal was then run onto the brick in a gradually enlarging pool, stirred and fed with the filler rod, the pressure of the welding flame being used to shape the new lug as it formed. As the lug was gradually increased in thickness, both the filler rod and the flame pressure were utilized to make the new lug approximate the original. After the first layer was placed upon the brick, a thicker layer was placed upon it in smaller but deeper melted pools. Each pool becoming in reality a part of all adjoining pools.

Unlike the crack weld, this lug weld had to be soft enough to permit a bolt hole to be drilled through it; also it had to be fairly soft throughout to prevent brittleness, as a hard, brittle, or spotted weld would break too easily when belting the manifold to the engine. In order to insure a fairly soft, tough lug, the operator had to be a little more careful with the lug weld—a little more certain that his flame was always neutral; a little more certain that the flame was handled correctly.

To assist in making a clean, soft weld, he used a patent flux powder throughout the entire process of building on the lug, a fact which should also have been mentioned in connection with the crack weld, as a flux was used upon it also.

In both cases, the flux powder was applied in the usual way by dipping the heated end of the filler rod into a pot of the flux and quickly returning it to the weld, where it melted and spread over the weld. Perhaps the greatest benefit derived from this flux powder—in fact, from any flux—was that it covered the molten weld with a protector from the oxidizing actions of the atmosphere, and from the oxygen of the welding flame. Burning flux tends to absorb oxygen before it can reach the molten metal.

After the new lug had been completed and smoothed, the casting was permitted to remain in its position upon the bricks until the weld cooled to the normal temperature. No covering or other slow-cooling devices were resorted to, since there was practically no danger of cracks. The casting was permitted to rest until danger of warping or distortion was passed, when

it was taken to the emery wheel where the new lug was dressed to its original shape or nearly so. It was then aligned to locate the bolt hole.

In building on new lugs this way, it sometimes happens that the fire brick has a slight chilling effect upon the molten metal, especially on the lower side, but this chill is only a very thin skin and is not hard to overcome once the drill is started. In the event of a chill, a small spot in the exact center of the hole location may be ground off with a coarse emery wheel. This small hollow spot will not interfere with the bearing surface of the lug but will remove enough of the chilled iron to permit the drill to get started.

Fig. 3 shows the new lug in the rough before being ground to shape on the emery wheel.

All of this proves that there is quite a little "headwork" to small jobs like a manifold, simple as it looks. By exercising some ingenuity the welder readily achieved the repairing of an innocent-looking job that could have kicked back with a vengeance in several places.

**MORAL:** Look the little jobs over carefully before starting on them, just the same as is done with the larger ones.

## Simple Fundamentals in Battery Service.

(Concluded from page 29.)

Each kit-box should be numbered, and the box and contents charged to the respective service men.

When not in use, they should be kept in a place separated from the service-garage but accessible at all times—preferably they should be in charge of the stock clerk.

Each day the boxes and contents should be carefully checked for missing articles. For the morale of the force, tools lost may be charged against the service men, unless it can be shown that they are not at fault.

This kit-box, which can be made locally at small expense, will quickly pay for itself in more systematic service, saving in tools, and customer good-will generally.

## Importance of Crankcase Lubrication Demonstrated.

To prevent excessive engine wearing, recent tests show that crankcase oil should be changed at least every 1,500 miles, preferably every 1,000 miles.

A new engine that was run 6,000 miles with oil changed at proper intervals, upon being disassembled showed no signs of wear. The same engine, reassembled and run 6,000 miles with old oil plus new oil as needed, upon inspection, showed a wear of 0.015 inch.

Truck and passenger car manufacturers recommend, for better performance and longer life, that crankcases be drained every thousand miles, the engine flushed with kerosene and new oil added.





## Avoid Oil Extremes

**The Remarkable Wandering Oil Groove of the General Lightning Cut Piston Ring Provides a Middle Course between Carbon and Friction**

Oil extremes ruin the life of piston rings. New rings, wearing in, are worn out. Not enough oil is provided to lubricate them. Prematurely aged, such rings leak compression. Too much oil becomes as bad as not enough. The cylinders fall heir to a multitude of carbon troubles.

The remarkable wandering oil groove, through controlled oil distribution, preserves the original molecular structure of the General Lightning Cut Ring.

It carries oil to heretofore unreached high points on the cylinder wall and lessens the natural friction between ring and wall.

It makes possible the functioning of its ingenious oil scraping edge. This oil controlling edge returns all excess oil to the crank case. It shuts down on compression leakage. It starves carbon. It saves needless oil consumption.

\* \* \* \* \*

The lightning cut itself, combining as it does, the old



step and diagonal cuts, provides a most effectual control of the compression charge.

Three other features of design—the individual cast—its concentric shape—and one-piece construction make for maximum piston ring efficiency.

The dealers, repair shops and garage men, who have waited for a piston ring they could guarantee to give increased power, greater mileage, fuel and oil economy and less friction and wear are invited to participate with others who have adopted our revolutionary profit-sharing sales plan in the marketing of piston rings.

**GENERAL LIGHTNING CUT  
PISTON RINGS**



# GENERAL UTILITY COMPANY

1324 Ogden St. Philadelphia Pa.

*Utilities that Sell Because They Serve*

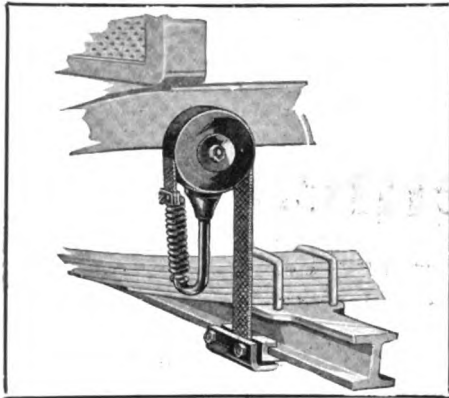
Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Accessories For Automotive Trade

## "Bull Dog" Bounce Absorbers Relieve Strain on Springs and Tires.

Longer life for tires and springs is the aim of the manufacturers of "Bull Dog" bounce absorbers.

This device may be attached to the front and rear axles of any make of car. The



The Bull Dog Bounce Absorber.

brake drum and brake lining strap in connection with the flexible spring is said to thoroughly stop the rebound, but does not retard the downward action of the springs. Thus the tires and springs are relieved of the usual road shocks and strains that wear them out prematurely.

It is also claimed to check the side sway which is such a familiar source of discomfort to the passengers in the car as well as a strain on frame and bearings. Even when going at high speed over rough roads, the passengers are never jolted from their seats.

The "Bull Dog" bounce absorber is said to be the only device of its kind that can easily be adjusted to the requirements of different weights and different springs. There are practically no cars that require any drilling in the frame; the absorbers are easily attached to the channel frame of the car.

Complete particulars and trade prices may be obtained by writing the Channon-Hughson Co., 229-233 W. Erie St., Chicago, and mentioning the American Garage & Auto Dealer.

## O. K. Giant Dry Rechargeable Battery Offers Fool-Proof Features.

Recently there has come to the notice of battery experts and battery users, a new type of automotive storage battery—one with a semi-solid electrolyte which receives its charge in exactly the same manner as does the ordinary storage battery.

Being impervious to water, heat, frost

and other elements which affect battery efficiency, the maximum life is assured, according to its manufacturer, the O. K. Giant Battery Corp. It further states that some of the first O. K. Giant batteries after being subjected to every conceivable abuse and test for three years, are still functioning beyond the expectations of the users, without the necessity of even the simplest adjustments being made.

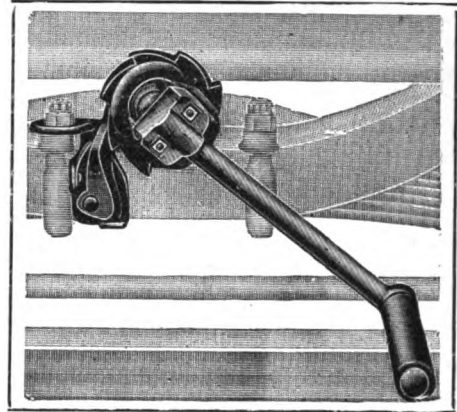
This may be partially accounted for by the fact that in place of employing acid in its original form, the electrolyte substance of the battery is a special patented compound which absorbs and retains the active elements or working properties of the acid, while in the process of the initial charging the destructive gases are given off.

When all the contributing ingredients are mixed, this material fills the battery completely, between positive and negative plates. It dries to the consistency of salt and remains so throughout the life of the battery, thus acting as a protective and current gathering coating for the plates.

The manufacturer also claims that with a semi-solid electrolyte, damage from freezing is entirely eliminated. In low or freezing temperatures, the substance is expanded, the special secret formula having been worked out according to caloric laws. By the same application of caloric laws, the electrolyte prevents heat development. Thus the manufacturer claims the plates

will not buckle, buckling being the result of over-heating.

Other feature points claimed for the O. K. Giant product are: 20 per cent more

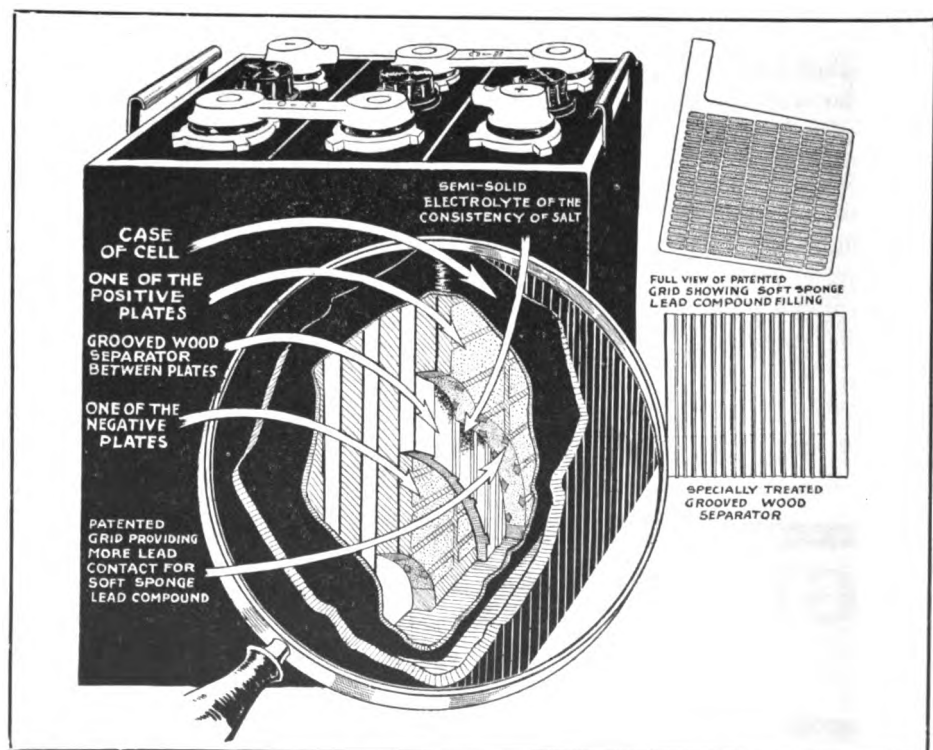


A Safeguard from Kicking or Backfiring.

power due to a more intense spark; no corrosion, and no sulphation. Prices and further particulars will be furnished upon request to the O. K. Giant Battery Corp., Gary, Ind.

## "An Ounce of Prevention Is Worth a Pound of Cure."

The Weldon Auto Specialty Co. is placing on the market a new invention called the "Non-Kick" device for Ford cars, which



Details of Construction of O. K. Giant Storage Battery.

# Would you like this money, Mr. Garage Man?

There is big money in handling the repair work on Electrical Starting and Lighting Equipment. The Motorist demands this service and if you are not equipped to handle it efficiently you will surely lose your trade to your more enterprising competitor.

Here is a complete and highly efficient Electrical Testing Instrument that you can install at small cost. It makes every known test on both Starting and Lighting Systems, and enables you to locate quickly just where the trouble lies. It is the equivalent of six separate Measuring Instruments of different ranges.

You can acquire more trade and a big reputation for efficient and prompt service with the

## Weston Model 280 GARAGE TESTING INSTRUMENT



This Instrument is extremely accurate, durable and serviceable. Its possession will place you a long way ahead of your competition not so equipped.

**Prompt Shipments  
from Stock—**

**Order at once**

**Other Automobile  
Electrical Measuring  
Instruments manu-  
factured by us are:**

**Model 441 "Fault Finder"**—a general utility instrument. Makes every test except measuring starting current. Has separate Voltmeter and Ammeter.

**Model 443 Battery Testing Voltmeter**—Takes exact measurements of the E. M. F. of individual cells. Provides for Cadmium test.

**Models 354 and 301 Ammeter**—For the dashboard or cowl. Tell instantly and accurately the exact condition of the battery. Instruments of extreme refinement—sensitive, yet rugged and sturdy.

**Weston Electrical Instrument Co.  
30 Weston Avenue, Newark, N. J.**

|             |              |               |             |
|-------------|--------------|---------------|-------------|
| New York    | Philadelphia | Denver        | Toronto     |
| Buffalo     | Pittsburgh   | San Francisco | Montreal    |
| Cleveland   | Richmond     | Detroit       | Vancouver   |
| Cincinnati  | Chicago      | Seattle       | Halifax     |
| Boston      | St. Louis    | Miami, Fla.   | Havana      |
| New Orleans | Minneapolis  | Winnipeg      | Mexico City |

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

it guarantees to safeguard any one from injury by the backfiring or kicking of the motor when cranking.

"Non-Kick" is very simple to put on as there is only one nut to remove. Any time the motor fires back or kicks, the device automatically disengages the clutch, allowing the motor to reverse, without injury to the one who is doing the cranking, or to the car.

Write to the Weldon Auto Specialty Co., 1104 Walnut St., Kansas City, Mo., for trade prices and more complete information.

Mention the American Garage & Auto Dealer when writing.

### Graphite Penetrating Oil for Curing Squeaky Springs.

Every dealer knows that squeaky springs not only hurt a motorist's pride, but they also hurt the springs. The Thomson Auto



Applying Graphite Penetrating Oil to Springs.

Specialties Co., of Columbus, Ohio, is confident that its product—Thomson's Graphite Penetrating Oil—not only has all the lubricating qualities necessary to preserve the automobile spring, but that its application is very simple. Graphite is a logical spring lubricant, but applying it in the usual way is dirty work, as everyone who has done it knows.

Certain ingredients in this new penetrating oil cause it to rapidly work through the leaves of the spring. It is claimed that it will dissolve rust and clean springs as thoroughly as if the leaves were taken apart and polished.

As is intimated by the name, it is claimed that it penetrates the smallest and most distant corners and cracks, finds the squeaks, and cures them.

The oil has been found to be useful around the garage for releasing frozen brakes, shackle bolts and king pins, no matter how firmly they may be rusted. Further information about this lubricant may be obtained by addressing the Thomson Auto Specialties Co., Columbus, Ohio. Mention the American Garage & Auto Dealer when writing for further particulars concerning this product.

### New Air-Tight Valve That Gets Added Service from Tires.

Do not lay the blame on a tire if it gives out prematurely. In a great many cases the tire valve has something to do with its wearing out.

If a tire is not kept inflated to the correct pressure at all times, it cannot be expected to give the service that it is guaranteed to give—and if the valve is not capable of holding the air, the pressure cannot be maintained. A Canadian inventor, Lieut. Mead, is said to have discovered the secret of the air-tight valve and hence the secret of getting all from the tire that it is supposed to give.

The construction of the Meade valve is simple but insures thorough efficiency. It is constructed with a heavy brass coil wire spring attached to a 1/8-inch brass tubing, through which the air passes when released by pressure on the plunger top. The air passes through two air port vents in the plunger, which is kept absolutely sealed under all conditions, by the heavy spring.

The plunger is held in position by a beveled shell, which is a separate part and screws into the top of the shank. As all the Mead parts are standard in size, if this plunger should be injured in any way, which is said to be improbable on account of the sturdy construction, a new part can be put in, and thus all the trouble and cost of installing a new valve is eliminated.

The simple principle on which the Mead valve operates—namely that of a strong coiled spring—precludes any possibility of leakage of air through the valve. No air can possibly escape, it is stated, until the plunger is pushed down far enough to bring the air port holes out of the shell in which the plunger works, the inside being conically bored. The moment that the pressure is released, the spring immediately pushes the plunger back into this conical boring, and it remains hermetically sealed until deflation is again required.

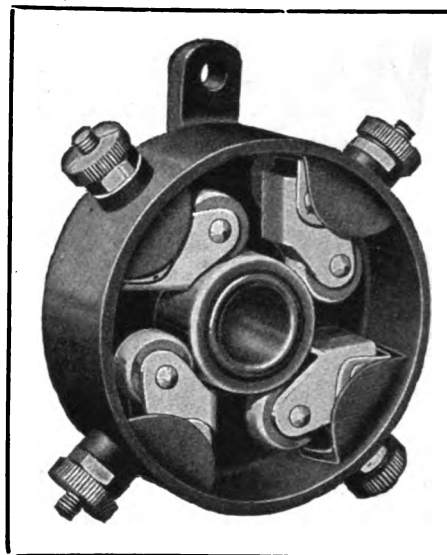
The construction makes inflation quick and easy, because of the two large air passages which admit a large body of air. It transmits the entire contents of the pump into the tube immediately. Deflation, also, takes but a few seconds.

Further information can be obtained from the offices and demonstration plant of the Mead Universal Co., located at 124 West King St., Toronto, Ont., Canada.

### Duntley Four Unit Timer, a New and Durable Device.

The extremely high speed of Ford motors especially in Ford trucks and Fordson tractors has clearly shown the necessity of

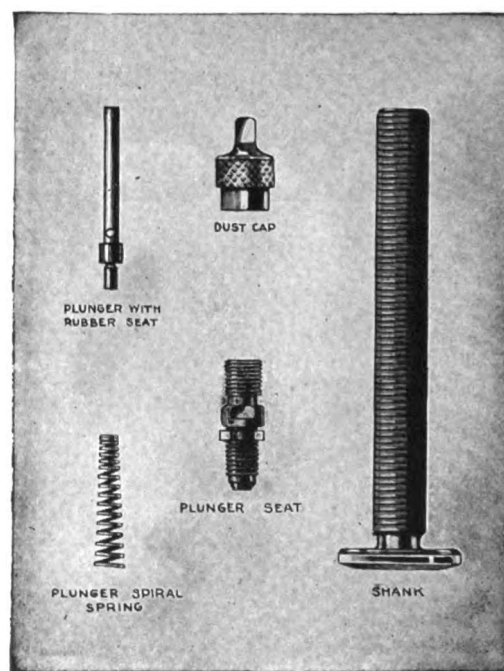
a durable timing device. Keenly realizing this demand, J. W. Duntley, of Chicago, has just perfected and put on the market the new 1921 model Duntley four-unit timer.



New Model Duntley 4 Unit Timer.

A glance at the illustration tells the story of the simple but sturdy construction of this timer.

In this timer there are said to be no adjustments to vary and no grinding wearing parts or delicate hammering contacts to become loose. Meeting the requirements of the Fordson tractor and Ford truck



The Construction of the Mead Air Valve.

motor, which are geared at a ratio of 18 to 1 and 12 to 1 respectively, its action and unending durability on Ford cars is assured, says the manufacturer.

"With timer misfires practically impossible and with its absolute insurance of equal spark duration in all four cylinders, the new Duntley four-unit timer guarantees perfect combustion, which not only





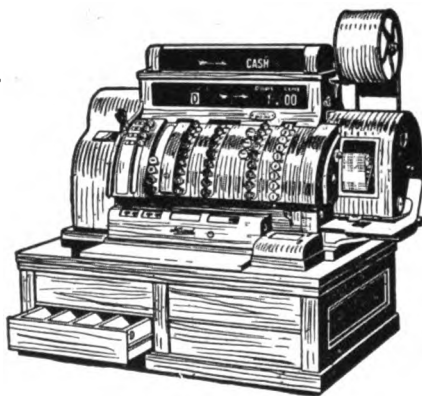
## An up-to-date National Cash Register would tell if this clerk is worth the raise that he is asking for.

**N**ATIONAL Cash Register records would tell instantly whether this clerk had increased his sales enough to make him worth more money.

Up-to-date National Cash Registers give complete daily records of how much each clerk is selling and the number of customers each clerk is waiting on.

They show which clerks are the most valuable. They enable merchants to fix wages on actual selling records.

They give the records needed for a profit sharing or bonus system. This makes the clerks directly interested in the success of the business. It puts them on their mettle and results in increased business.

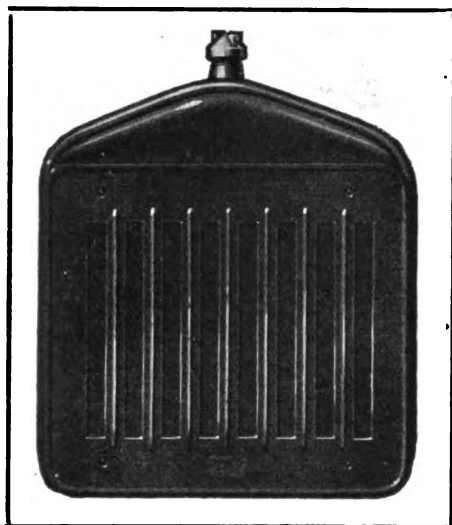


The National Cash Register Company, Dayton, Ohio  
Offices in all the principal cities of the world

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

means a big saving in gas, but a tremendous increase in power."

The new Duntley four-unit timer readily fits the well known Duntley wire and ter-



**New and Durable Ford Radiator Shutter.**

minal guard. It is guaranteed by the manufacturer for one year regardless of mileage or service.

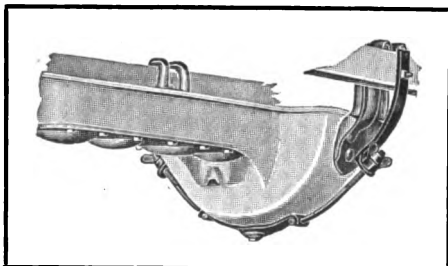
Write for further particulars to J. W. Duntley, 1004 Michigan Ave., Chicago.

### Keep Your Old Ford in Service—Use a Crankcase Support.

"A first class article that fits" is the way in which C. R. Backus describes the Johnson crankcase support which he is placing on the market.

This support is said to add strength to the Ford car at a vital point and prevent the crankcase arms from breaking or becoming loose where they are riveted to the crankcase. Its use by several large corporations is high endorsement for they acknowledge it to be a most essential equipment for the Ford car or truck.

The Johnson crankcase support is made of malleable iron, fits any model of Ford car or truck, and is easily attached. The cradle plate is designed to fit perfectly under the crankcase. Another feature of the



**Ford Crank Case Support Which Adds Strength.**

support is its prevention of oil leaks and vibrations.

Dealers should address C. R. Backus, Mystic, Conn., for further particulars; mention the American Garage & Auto Dealer when writing.

### Amco Shutter Adds to the Efficiency of the Ford Radiator.

With winter coming on, jobbers and dealers appear enthusiastic about stocking new Ford accessories. A new product in which they will be interested is the Amco shutter which, according to its manufacturer, the American Metals Corp., solves the problem of motor heat efficiency for Fords in all kinds of weather.

The shutter has a dash adjustment and can be attached in five minutes. It is made of highly-enameled sheet steel, and is very durable. It also acts as a protector for the radiator.

Other features claimed for the Amco shutter, which are favorable ones, are reduction of carbon deposit, saving of fuel and oil, and improved carburetion. Dealers should address American Metals Corp., Indianapolis, Ind., requesting further particulars concerning the Amco shutter. Mention the American Garage & Auto Dealer when writing.

### Be Up to Date! Transform Your Ford Into a Packard.

Sounds boastful, doesn't it? But the Apco Mfg. Co. has certain Ford specialties which may well interest dealers. One



**The Apco Anti-Rattler.**

of its specialties is an anti-rattler which, being fitted with heavy springs, takes up the wear in the Ford radius rod and steering rods. The installation is said to be very easy.

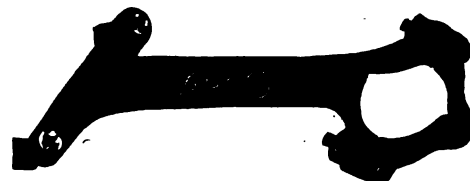
Apco, further, seeks to improve upon the Ford signaling apparatus, placing the horn button in a more accessible position—on the gas lever instead of at the front of the steering column. The Apco horn button consists of the button, bracket and wire ready to attach.

Made from malleable iron, and black enameled, the Apco steering column brace is said to eliminate the customary vibration felt by most Ford drivers at the wheel. It is made to fasten to the upper part of the dash at one end and to the steering column at the other.

Dealers should address The Apco Mfg. Co., Providence, R. I., for prices and additional information. Mention the American Garage & Auto Dealer when writing.

### Nokorode a Non-Corrosive Soldering Paste for General Use.

Nokorode is a "safe" investment. It is a soldering flux that is guaranteed by its manufacturer, the M. W. Dunton Co., to be absolutely non-corrosive. It does away with the obnoxious fumes which make acid soldering so disagreeable. Shipped in the



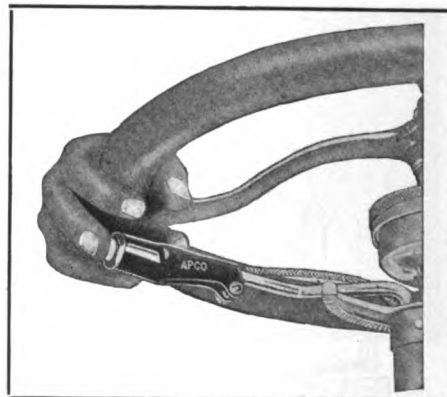
**A Substantially Constructed Steering Column Brace.**

condensed form of salts, Nokorode saves excessive transportation charges, because freight does not have to be paid on water. Nokorode salts can be cut with from 80 to 35 parts of water.

Various tests have proved the value of Nokorode as a soldering flux. An interesting demonstration was made in which extra fit metals were not used, but preference given to those metals which were very unfit, discolored by oxygen exposure and not cleaned in any manner. Perfect results were obtained. Users of Nokorode will appreciate the fact that it can be used with the dirtiest metal, which requires no scraping or cleaning before the application of the flux.

Nokorode soldering kits containing complete instructions for soldering, one soldering iron, two pieces of emery cloth, one stick of solder, one package of friction tape and one two-ounce can of Nokorode soldering paste are invaluable aids in the shop. Dealers will find customers interested in the soldering kit, which can be used in making repairs on the road.

For soldering all metals—except aluminum—this soldering paste is guaranteed by the manufacturer to be safe as resin, and



**The New Horn Button Is Attached to the Gas Lever.**

rapid as acid. It is said to be ideal for delicate work.

Write to the M. W. Dunton Co., Providence, R. I., for more definite details. Mention the American Garage & Auto Dealer when writing.

**BRUNNER**

## Remember When

the future of the garage business was very uncertain and the proprietor could put his garage equipment in a hand bag? The little machinery bought was usually on a price basis. The cheapest that would do the work. Permanence, durability and economy was little considered. Everything was cheap in those days, so operating costs were not seriously thought of.



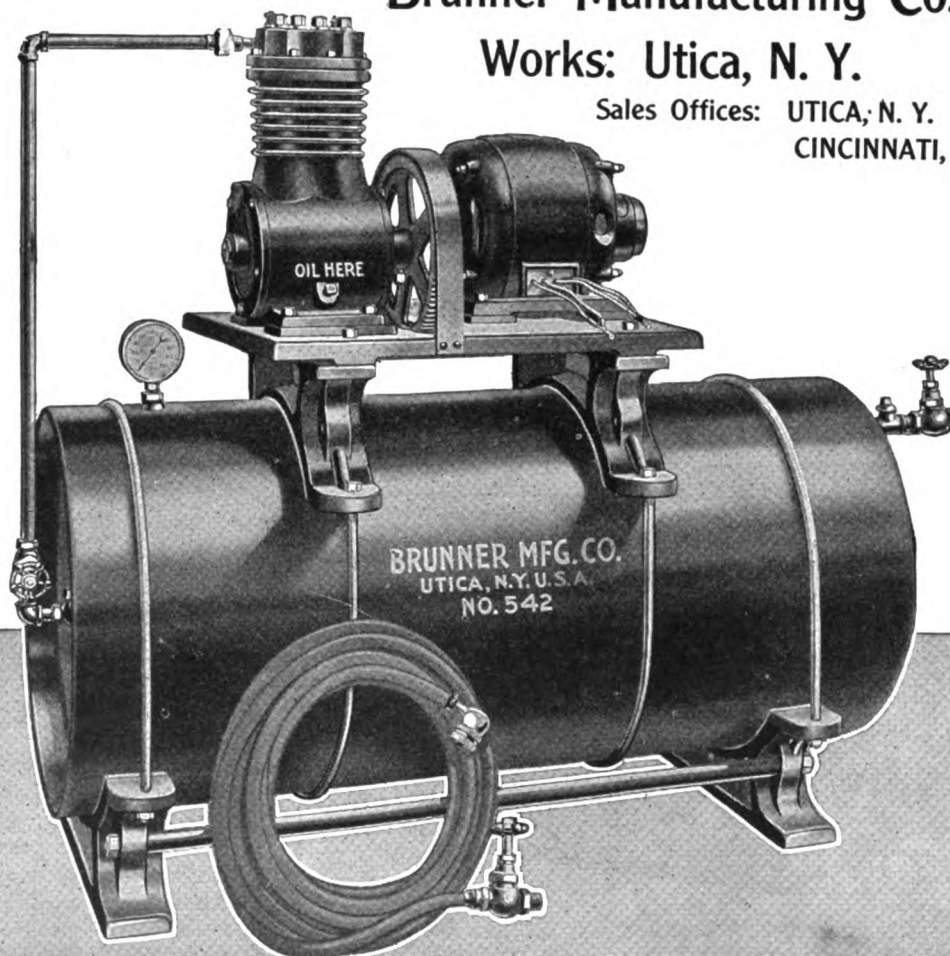
The permanence, progress and prosperity of the garage business has put old time equipment, methods and ideas in the morgue ever to remain. To-day scientific methods, approved practices and the best machinery money can buy is the rule everywhere.

Brunner Air Compressors more than fulfill the present day demand.

### Brunner Manufacturing Co.

#### Works: Utica, N. Y.

Sales Offices: UTICA, N. Y.  
CINCINNATI, O.



# Garage Equipment for Better Efficiency

## Itemized and Totaled Receipt Printed by Cash Register.

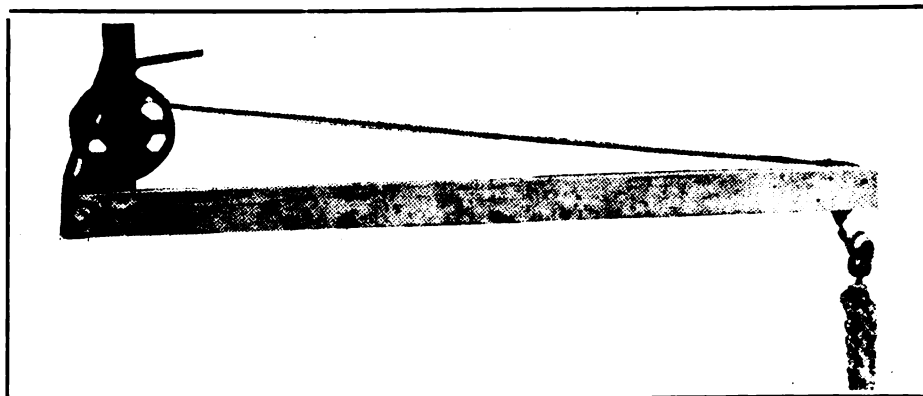
A cash register which prints an itemized and totaled receipt, has been placed on the market by the National Cash Register Co., Dayton, Ohio. For years, merchants have needed such a machine. The new register is said to stop mistakes in adding the items of a sale. It also saves the time of clerk and customer, says the manufacturer, and gives the merchant protection and information about his business.

The old way of adding up the items of a sale by hand, brain and pencil has long been a stumbling block to efficiency in retail stores. With this method, when several articles are purchased, it is necessary for the customer to wait while the clerk adds the items and makes the change. The time required for this work, when multiplied by the number of transactions every day, amounts to many hours. It greatly adds to the expense of operating the store.

Then, too, clerks are only human and mistakes will happen. Errors mean losses. If an overcharge is made because of wrong addition, the merchant may lose a customer. If an undercharge is made, the merchant loses the profit on the sale.

Manufacturers of time and labor-saving equipment were anxious to help solve this problem. Experts from the National Cash Register Co. spent many months studying store conditions. The results of this survey were given to the engineers at the factory. Inventors were put to work making practical some of the ideas received from merchants and clerks. A new cash register was designed. It was different from anything ever before attempted.

With the new machine, each item is registered separately. By turning an operating handle, a receipt is printed and issued



Farnham's One-Man Wreck Hoist Enables One Man to Bring In Any Wreck Unassisted.

by the register. This receipt shows the printed amount of each item sold and the total amount of the sale which has been added by machinery.

The total of each transaction is also printed on a paper roll inside the machine. There are other features that are found in all high grade cash registers. These include adding counters to show the total amount of sales, and the number of customers waited on. The amount of every item sold is shown between glass at the top of the machine.

This new register provides quick and accurate service for customers. The items are added and recorded at one operation. In many stores the use of a written check is eliminated by the itemized receipt. The figures are indelibly printed and cannot be changed. Customers have confidence in machine-made records and additions.

The receipt prevents disputes regarding overcharge for any item or for the total amount. It identifies by price any item that may be returned for exchange. The receipt makes public the record of the amount

paid for every article bought by the customer. This removes temptation from employees, because all amounts must be correctly registered.

Clerks are finding the new machine a valuable aid in increasing their efficiency. It makes their work easier, lessens responsibility and gives them more time for selling and progress.

The perfection of this register has solved many difficult problems for merchants. It saves time and work and stops mistakes in adding. It gives information and protection that are necessary for the successful operation of a store. Although on the market but a few months, already the new machine is in use in 44 lines of business.

Write for further information to the National Cash Register Co., Dayton, Ohio. Mention the American Garage & Auto Dealer.


## A Garageman's Labor Saver—A New One-Man Wreck Hoist.

The attention of readers of the AMERICAN GARAGE & AUTO DEALER will be attracted by the announcement of Farnham's wreck hoist—for this new machine is strictly a one-man three-ton device.

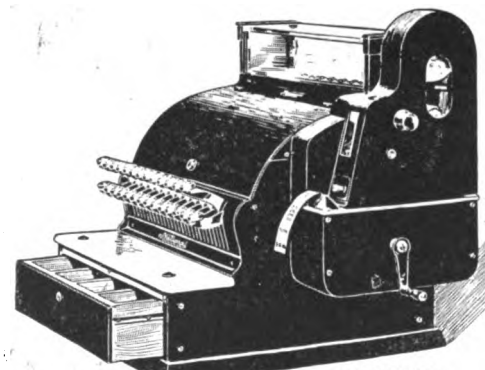
It is possible, says the Paris Auto Co., its manufacturer, for one man to bring in any wreck unassisted. The machine has been thoroughly tested for both pulling or lifting wrecks out of ditches, up steep inclines, and for towing, and has responded remarkably in every instance.

Farnham's wreck hoist can be attached to any truck by one  $\frac{1}{2}$ -inch bolt, and is simple in construction as well as in operation. To one end of a 6-inch by 6-inch hickory beam is attached an all-steel double-gear ratchet windlass operated by a hand crank. The ratchet makes it possible to hold the load to any height. A flexible cable is arranged so as to give a double lifting power.

For trade prices and more detailed infor-



**OLD WAY**  
By hand and brain and pencil.



**NEW WAY**  
The items are added by machinery. This new kind of cash register prints an itemized and totaled receipt.

J. SMITH  
COMPANY  
10 MAIN ST.

|                |  |
|----------------|--|
| 0.17           |  |
| 0.32           |  |
| 0.48           |  |
| 0.09           |  |
| <b>TOTAL</b>   |  |
| <b>\$01.06</b> |  |

Copy of receipt printed for each customer.

The New Cash Register Which Prints an Itemized and Totaled Receipt.



**Which Do You Sell—**  
the HARVEY SPRING, which will outlast  
the car, or the replacement spring, which,  
in turn, must be replaced.

**Harvey**  
**RACINE**  
BOLTLESS  
AUTOMOBILE  
**SPRINGS**

Guaranteed

Easy  
Riding

**T**HE problem focuses down  
to the question of whether  
to profit by frequent replacements  
or by consumer satisfaction.

The replacement spring that brings back a  
complaint is not a business builder for you.

When you sell the Harvey Spring you  
sell insurance that protects your customer  
against breakage or sagging of the spring  
and protects you against complaints. It  
is a transaction that satisfies both perfectly.

The Harvey guarantee is made possible  
because of a number of factors. The  
Harvey Spring is boltless, therefore, it  
has no weak spots. It is heat-treated  
and tempered accurately and uniformly  
by the patented Harvey process. "Third  
degree" testing methods eliminate any  
possible chance of a Harvey Spring that  
does not measure up to the high Harvey  
standards, leaving the factory.

Harvey Springs stand up under the strain  
that breaks the ordinary spring, yet they  
impart remarkable riding ease to the  
motor car.

Harvey excellence and the Harvey guaran-  
tee are business builders for the Harvey  
dealer.

**HARVEY SPRING & FORGING CO.**

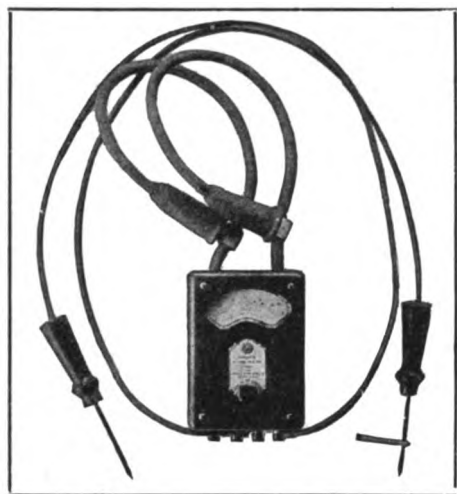
1048 Seventeenth St.

Racine, Wisconsin

mation concerning this new labor-saving hoist, write to the Paris Auto Co., Paris, Ill., and don't fail to mention the American Garage & Auto Dealer when writing.

### **Hyrate Electro-Trouble Detector— Five Instruments in One.**

A combination instrument for detecting troubles in the electrical apparatus of any make of automobile has been developed by the Service Station Supply Co. The Hy-



**The Five In One Trouble Detector.**

rate electro-trouble detector, as the instrument is called, combines five instruments in one.

It is so designed that a series of simple tests, readily made and requiring no special electrical training, will enable anyone with this instrument to discover the cause of any defect, or failure in the generator, starting motor, lights, horn, switches, wiring, battery or ignition apparatus.

With this detector, a complete and easily understood instruction book is furnished. The book is also an excellent textbook for wiring and electrical troubles.

The Hyrate electro-trouble detector is a combined voltmeter and ammeter with three voltage and two ampere scales for accurately testing and measuring any electrical pressure or current found in automobile equipment.

With the detector, leads, prods, clips, and a Cadmium test electrode are supplied. There are no external shunts. The detector is especially designed for convenient connections and rapid work.

Dealers and garagemen should write at once to the Service Station Supply Co., Detroit, Mich., for descriptive folders and trade prices. And, don't forget to mention the American Garage & Auto Dealer when writing.

### **New Electrical Recording Instruments in Smaller Sizes.**

Due to the heretofore relatively small demand for small-size, round-pattern, switchboard-type alternating-current instruments, the principal instrument manufac-

turers have confined their lines to the conventional 7½-in. and 9-in. diameter sizes. The Roller-Smith Co., however, realizing the growing need for smaller instruments, has developed two sizes of these devices which are particularly desirable in connection with battery-charging outfits, current rectifiers, and motor-generator sets.

The company's Junior Imp type A. C. ammeters and voltmeters are furnished in capacities as high as 50 amperes and 150 volts, in either base flange or flush cases. The capacities of the 4-in. Imp A. C. ammeters and voltmeters are as high as 50 amperes and 300 volts and the 4-in. Imp A. C. wattmeter has maximum capacities of 30 amperes and 300 volts.

The mechanism of the ammeters and voltmeters is of the electromagnet type and of the wattmeters electro-dynamometer type. The jewels are quality sapphires; pivots are of highly polished and hardened steel. The case is of heavy brass in one piece and the whole structure is guaranteed to be dust, moisture, and practically waterproof.

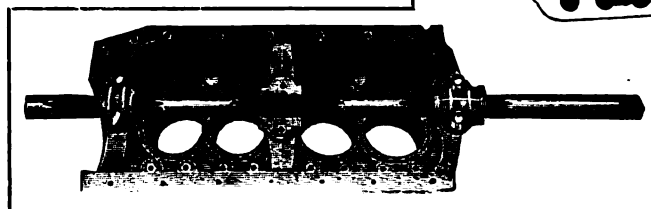
Write to the Roller-Smith Co., 233 Broadway, New York City. It will send you trade prices and illustrated booklets describing its new products. And don't fail to mention the American Garage & Auto Dealer.

### **Greb Co. Inc. Markets Sturdy General Purpose Press.**

The Greb Co., Inc., has placed on the market its "One Best Bet" in a general purpose press. It is said to be quick in action and its sturdy steel construction insures its strength.

The ratchet wheel has a ball thrust bearing to eliminate friction and the ratchet can be used in either direction. The wheel is located between two heavy steel castings, the upper end of which is the same shape as the frame and is riveted to it. Two triangular shaped steel plates also give double reinforcement at this point.

It is possible to operate the press in a small space. It hinges on the base so as to lay down on the floor for long range work. The bars are



**Lewis Combination Reamer in Position for Reaming Main Bearing.**

instantly interchangeable by sliding them between the bolts. All base, upper cross members, and top plates are riveted.

The company's new 20-ton press is designed for service station work on pleasure cars and light trucks. A heavy duty 40-

ton press for all types of garage and general machine shop work is also manufactured.

Descriptive literature and trade prices will be sent to all readers of the American Garage & Auto Dealer who write to the Greb Co., Inc., 172-173 State St., Boston, Mass. Don't forget to mention this paper when you are writing.

### **Efficient Combination Aligning Reamer for Ford Motors.**

Especially designed for Ford motors is the Lewis combination aligning reamer which is presented to the trade by the Lewis Tool Co. This reamer is not only declared by the manufacturer to give perfect alignment on all bearings, but is claimed to be a big time saver as well. It will not, furthermore, dig, chatter, or pull the babbitt, and end thrust is eliminated.

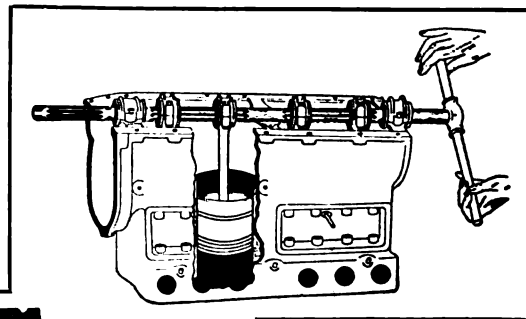
The company guarantees that the reamer, in labor saved, will pay for itself in the first three motors overhauled. The ordinary workman can use this machine. It is not necessary to be an expert mechanic to obtain favorable results.

Simple and correct in construction and easily operated, the reamer means a distinct saving to any repairman.

Write for trade prices and descriptive folders. Address The Lewis Tool Co., 612 Fifth Ave., South, Minneapolis, Minn. Mention the American Garage & Auto Dealer when writing.

### **Valve Refacing Made Simple With Fairbanks Refacing Tool.**

A very interesting refacing tool which not only refaces worn valves in the quickest possible time, but is said to save time

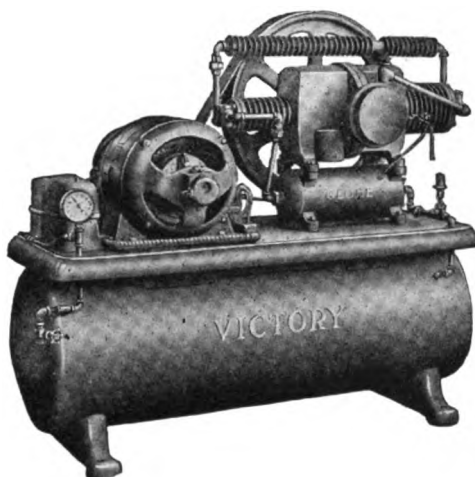


**Combination Aligning Reamer in Position for Reaming Connecting Rods.**

in valve grinding, is being distributed by the Fairbanks Co.

This tool is known as the universal valve refacer.

Write to the Fairbanks Co., Broome & Lafayette Sts., New York, for particulars.



**"VICTORY" Complete Automatic  
Motor Drive Unit**

# **GLOBE AIR SERVICE** **your best advertisement**

A first class air service is the most effective and profitable form of advertising that you can use. Any motorist prefers to stop at a garage where his tires are inflated promptly and properly. Your air service is your first point of contact with a large number of car owners. If the service is prompt and dependable, a favorable impression is made—resulting in profitable business.

When you install a GLOBE outfit you are certain of giving an air service which cannot be excelled—and which will prove a big factor in building your business.

The Globe manufacturers made the first two-stage air compressors, setting a standard that has never been equalled.

Globe Air Compressors meet all the requirements of garage service. They provide ample pressure and capacity for inflating the largest pneumatic truck tires. As these tires are daily becoming more numerous, you realize the need of being able to give them service. Globe Air Compressors are noted for their low operating cost and great durability, as well as the dependable service they always render.

*Write Department A-G for Bulletin.*

## **GLOBE MFG. COMPANY**

Battle Creek, Mich., U. S. A.

# **GLOBE** *Air Compressors*

# News of Manufacturers and Jobbers

## "Whistler" Manufacturers in Automotive Equipment Association.

The Automatic Safety Tire Valve Corp., of New York City, manufacturer of Whistlers, has been formally notified of its election as a member of the Automotive Equipment Association. The election to this im-



George H. Crossan is President of Company Which Manufactures "Whistlers."

portant association of accessory manufacturers and jobbers indicates the steadily growing demand for Whistlers.

The new member of the association will be represented at future conventions by George H. Crossan, president; and S. X. Newman, vice-president.

## Plans for Chicago's Accessory Show Practically Perfected.

The annual Chicago Accessory Show will be held as usual this fall at the Coliseum the week beginning November 14. All arrangements have been made, including the leasing of the equipment of the American Railway Appliance Co. which makes a very splendid and attractive exhibit.

## Canadian Branch Plant for Kennedy Car Liner & Bag Co.

Manufacturers of Kennedy car liners, automobile storage covers are now operating a branch plant at Woodstock, Ont., Canada, for the purpose of serving present customers in the Dominion. It is their intention to broaden their field of service there.

Literature concerning Kennedy products will be furnished upon request. Address

Kennedy Car Liner & Bag Co., Shelbyville, Ind., mentioning the American Garage & Auto Dealer.

## Detroit Steel Products Co. to Increase Spring Output.

Additions to the motor spring department of the Detroit Steel Products Co.'s plant at 2250 East Grand Blvd., Detroit, will raise its capacity to 1,920,000 springs a year, enough springs to equip 45,000 cars and trucks a month. This represents an increase of nearly 50 per cent over its present output.

A new forge shop and steel storage bins—242 ft. x 65 ft.—are included in the additions to the plant. The raw material will be unloaded from the cars, by means of 16-ton electric cranes that will carry the steel to the storage bins and to the forge shops. The storage bins will have storage space for 20,000 tons of steel.

The new forge shop will be equipped throughout with the latest designed spring-making machinery, an example of which is a new spring-forming machine that forms, quenches and hardens the leaf in a single operation. This ma-



S. X. Newman Will Represent His Organization at Association Conventions.

chine makes an eight-leaf spring in each revolution, requiring about one minute.

For prices and information concerning its products write to the Detroit Steel Products Co., Detroit, Mich.

## Employees to Share in Management of Federal Electric Co.

Announcement that plans are in contemplation under which employees of the Federal Electric Co. will have a voice in the management of the company, was made by John F. Gilchrist, president, in an address delivered in late June, at a housewarming at the concern's new plant, 87th and State streets, Chicago.

"We want our employees to feel that their



Group of Employees' Children Gathered Round President of Federal Electric Co.

efforts are being appreciated," declared Mr. Gilchrist. "We cannot give a definite outline at present of what the plan will be, but it will be in conformity with some of the new ideas of employees' representation."

Mr. Gilchrist told the employees that they could purchase stock in the company at almost any terms convenient to themselves and said he was very pleased to observe that approximately 40 per cent of them were already stockholders.

More than a thousand persons were guests at the housewarming which was celebrated by dancing, baseball games, field events, vaudeville, and a luncheon.

## The National News—The Snappiest of Oil Trade Journals.

If you are not getting the "National News," published by the National Refining Co., Cleveland, Ohio, you are missing something.

The National Refining Co. you know, manufactures En-ar-co products, En-ar-co motor oil and White Rose Gasolene, axle grease, etc. Well, the little booklet published monthly by the company is full of all kinds of interesting things about gasoline and oil and grease. There are some good jokes in it, too. That's what we meant when we said you were missing something if not receiving "National News."

Copies of this "regular" booklet will be





**LOX-ON**  
TRADE MARK  
**AIR CHUCK**  
"DOESN'T RUB THE RUBBER"

*View of the Whistler  
and Lox-on in action*

**E**XACTLY what you've been wanting a long, long time—A chuck that lasts without requiring new washers every day. One that is guaranteed not to leak!

The Lox-on Air Chuck wears indefinitely. You don't have to replace, or repair it or any part of it. By a simple lever it grips the valve tightly. It is as easy and quick to work with as the old, ordinary gauge and is infinitely superior to it in saving and long-lasting qualities. Because the Lox-on **can't leak, it helps you save electric bills, wear and tear on pumps and no end of time and trouble.**



Order one today for your air hose connection. You will find that it increases the efficiency of your shop to a marked degree. \$3.00 each.

Dealers—write us or ask your jobber.

**Whistler**  
TRADE MARK  
*"IT WHISTLES WHEN IT'S HAD ENOUGH"*

### PRESSURE REGULATOR

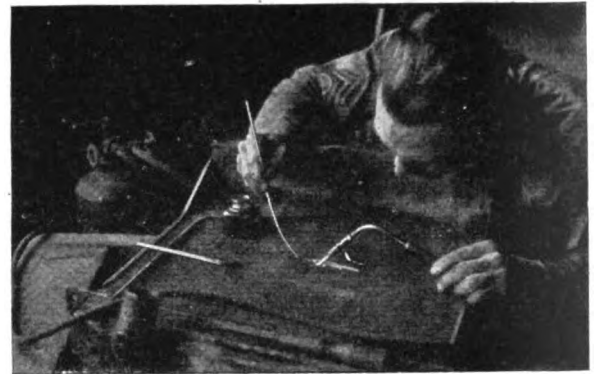
Screw the Whistler on over the ordinary tire valve. Set it for desired pressure. As soon as that pressure is reached, a cheery "whistle" announces enough. Then it automatically closes. \$4 per set of 4.

*The Whistler is used as regular equipment on Dural Antimony Hand Made Tubes.*

**Automatic Safety Tire Valve Corp.**

1753-55 Broadway, New York

Factory: Long Island City, New York



## Weld—Solder—Burn—Braz With the Washburn Gas-and-Air Torch

Here is the handy light-weight, light-expense torch, automotive and battery repair men have long been looking for.

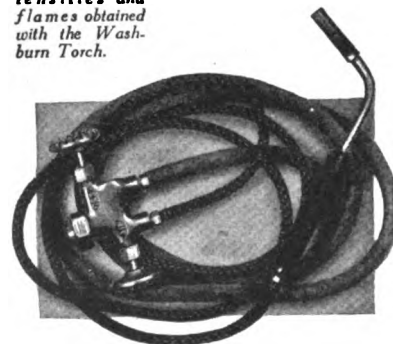
Though the Washburn Torch is light in weight (4 oz.) it is a Giant in Power. It produces from gas and air a needle pointed flame which is under instant control through 4000° of heat to 5300° Fahrenheit.

The gas for fuel is derived from a commercial Prest-O-Lite tank. Air may be supplied from garage air hose, inflated tire or other air source furnishing 2 pounds pressure or over. Fuels are consumed in the ratio of 15 parts of air to 1 of gas. If Oxygen-Acetylene flame is required, this torch, fitted with special tips, becomes an Oxy-Acetylene Torch.

This torch replaces soldering irons and makes radiator repairing an easy task. Tearing down and building up batteries is a quick job with the Washburn Torch. No other source of heat is necessary. The flame never pops out when reduced to its lowest intensity and is of volcanic heat when accelerated for brazing, welding or lead burning.

The Washburn Torch complete is the one torch that does every job in the automotive repair shop requiring heat—quicker, easier and more economically. Every one of your workmen should have one. Supplied by your jobber or by us direct. Ask for details.

*These illustrations show the wide range of heat intensities and flames obtained with the Washburn Torch.*



**WASHBURN  
BURNER  
CORPORATION**

General Offices  
and Works

Kokomo - Indiana

## APCO Equipment for FORDS

### Stop that rattling Steering Wheel on Your Ford

The steering column brace eliminates all vibration of the wheel and holds it solid. Other cars use one - *Fords Need It.*

Sold by dealers everywhere, or prepaid on receipt of price.

Apco Mfg. Co., Providence



### Puts Your Ford Horn where you can reach it. It is

attached to the throttle or gas lever where it is under the driver's finger at all times.

**APCO Horn Button**  
consists of button, bracket and wire  
Sold by dealers everywhere, or prepaid on receipt of price  
Apco Mfg. Co., Providence, R. I.

### Does Your Ford Wander off the Road?

#### FRONT AXLE BRACE

Holds axle firmly in position, reinforces front radius rod preventing bending and breaking.

Stabilizes the whole front of your car  
At your dealer or send his name with your order direct to  
Apco Mfg. Co., Providence, R. I.

**\$2.50**

Also made in Angle Steel - \$1.50

### Hitting on all Four

The testing valve in the new  
**APCO MUFFLER**  
tells you at once and finds the skip if there is one. It can't explode, loosen or rattle and is designed to muffle the exhaust without back pressure.

At your dealers or if not sent direct on receipt of price.  
APCO MFG. CO. PROV. R. I.

**\$5**  
COMPLETE

**MAKES YOUR  
FORD  
MORE CAR**

### Is Your Ford Full of Rattles?



**STOP** this source of annoyance and danger at once with—  
**APCO Anti-Rattlers**  
Heavy springs automatically take up the wear  
Radius Rod 1 in a box 50c ea.  
Steering Rod 2 in a box 50c pr.  
At your dealers or send his name with your order direct to  
**APCO MFG. CO.**  
Providence

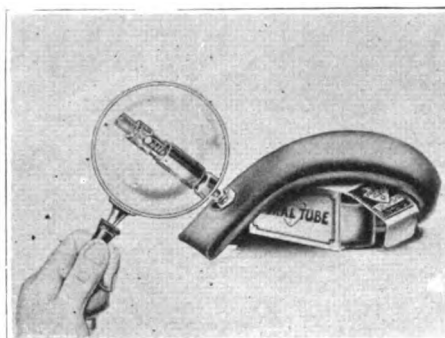
**Send for Our Catalog  
and Price Lists**

**APCO MFG. COMPANY**  
Providence, R. I.

sent upon request to any interested reader of the American Garage & Auto Dealer. Write to the National Refining Co. for copies and don't forget to mention this publication.

### Whistlers Included in Regular Equipment of Dural Tubes.

Of more than passing interest to dealers, is the announcement of an agreement made between the Dural Rubber Corp. and the



Whistlers Will Now Be Sold on Dural Tubes.

Automatic Safety Tire Valve Corp. whereby automatic pressure regulators are to be included as regular equipment of all Dural tubes.

Heavy sales of the Dural-Whistler combination are confidently expected by its manufacturer.

### New Passenger Car on Market— the "Globe Four."

The Globe Motors Co., of Cleveland, Ohio, announces the "Globe Four," one of the latest additions to the ranks of new fours, as having a special appeal for the business man because it combines medium size, facility of handling and economy of operation with genuine comfort and distinctive appearance.

Special features of the "Globe Four" are: Supreme four-cylinder L-head motor

Chas. H. Davies, president of the Globe Motors Co., states production will commence on a quantity basis about October first. Already distribution arrangements have been completed for over half the expected output. Dealers and garage owners can secure additional information by writing to The Globe Motors Co., Cleveland, Ohio. Mention the American Garage & Auto Dealer when writing.

### Catalog of Billmont Wrenches that Will Interest the Trade.

Garagemen, repairmen, and dealers will find in the catalog, "Billmont Wrenches," issued by the Edgar C. Guthard Co., much valuable information. On its well-illustrated pages are complete and interesting descriptions of the company's products, which include the master wrench, speeder, junior, rim brace, long or short T, offset and ratchet.

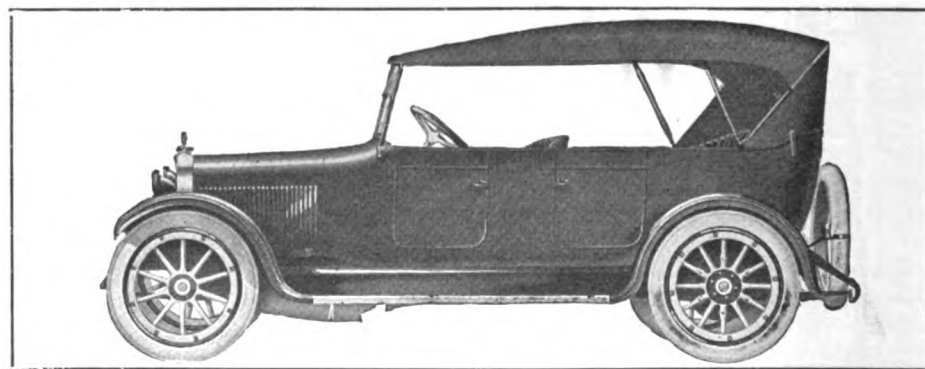
Billmonts were devised originally for the use of the expert mechanic. They are made with that perfection of operation and nicety of balance, speed of execution and certainty of results demanded by the man whose working day is an intimate association with tools. The amateur will find the use of these tools not only a real pleasure, but a real economy.

The Billmont universal nose piece, with 24 interchangeable sockets, makes the compact, light-weight car owner's set a veritable traveling repair shop. No matter what happens, or where, there is a wrench in the Billmont set that will reach the trouble and a socket that will fit the nut.

Dealers and garagemen should write at once to the Edgar C. Guthard Co., 361 East Ohio St., Chicago, for copies of this interesting book.

### American Influence Showing Itself in European Automobile Plants.

On his return from his recent trip to England and France, Ira A. Kip, president

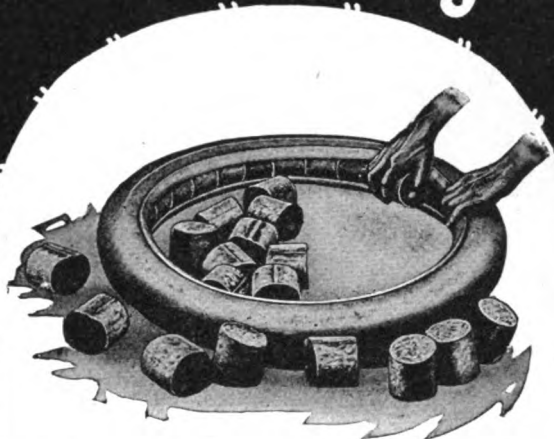


The Globe Four is a New Member of the Automobile Family.

of 39 3/4 hp. at 2,200 r. p. m.; Delco ignition; special honeycomb radiator; Borg and Beck clutch; special Warren transmission; five-passenger touring body or two-passenger roadster body; and 115-inch wheelbase.

of the Duratex company, stated that the influence of American methods in automobile construction and quantity production in Europe is more clearly shown this year than in any other period of the industry.

## The TIRE FILLER that has made good



### Trouble-proof tires with ample resiliency

is a combination that was long sought by the motoring public. Some tire fillers failed to stand up under long service—most of them lacked the essential resiliency. But these two vital qualities were at last combined in

## NATIONAL RUBBER TIRE FILLER

It has brought joy and satisfaction to tens of thousands of car and truck owners. It has done away with punctures, vulcanizing, patching, tire repairs of all kinds. Users get 10,000 to 20,000 miles out of every tire.

Besides, National Tire Filler has a wonderful resiliency. It takes the place of air, rides as easy, and does away with the inner tube.

National Rubber Filler is made of the best grade of rubber, cut in small particles, treated, moulded and vulcanized by our special process. The result is a compound that is light, strong and resilient. Made in sizes to fit all standard tires. It is laid in the tire and not melted or poured in. Will not harden, freeze, or melt—fully guaranteed against deterioration in any form.

DEALERS—National Rubber Tire Filler sells because it has made good. It combines comfort with economy of tire upkeep. We have a fine proposition for you. Write us today.

**National Rubber Filler Co.**  
210 College St. Midlothian, Tex.

## The best and easiest way to grind valves

is with a light, rugged, well balanced, portable, power-driven tool with ample power. Hand grinding has been rendered obsolete by the

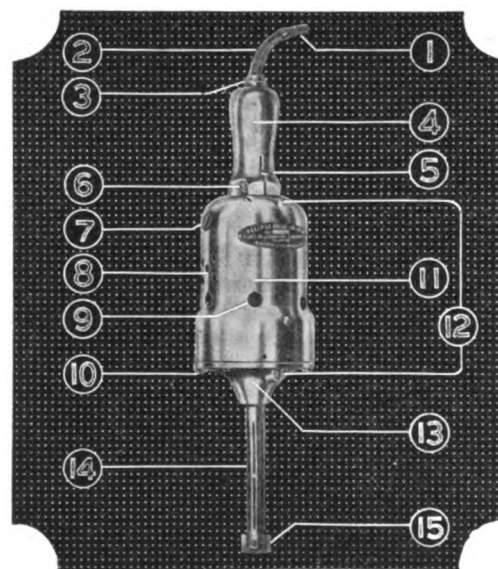
## ECLIPSE ELECTRIC VALVE GRINDER

with its famous ballistic movement—a unique and patented feature. This grinder is a notable example of machine labor replacing hand labor. It not only does a much better job than the hand method but does it much more quickly and at a fraction of the cost.

The ECLIPSE VALVE GRINDER is rapidly becoming the standard grinding equipment for automotive factories, garages, repair shops and service stations.



Note the features shown in illustration.



1. Flexible Cord
2. Wire Cord Protector
3. Cord Clamp Nut
4. Detachable Handle
5. Trigger Switch
6. Handle Clamp Screw
7. Accessible Brush Holders
8. Motor Ventilating Holes, Intake
9. Motor Ventilating Holes, Exhaust
10. Six Flange Screws
11. Oilers for Three Bearings
12. Main Housing
13. Cover Flange
14. Oscillating and Rotating Shaft
15. Valve Bit

Write for circular and prices

**ECLIPSE VALVE GRINDER CO.**  
Dept. C, 20th St. at Oak, Kansas City, Mo.

"It is astonishing," said Mr. Kip, "to note how fast certain European manufacturers are coming to quantity production. All of the manufacturers with whom I talked seemed to realize that the hope of the auto-

used to "back home." So they set about remedying the difficulty by importing a few American filling stations for their own needs.

These service stations have been conveni-

charging, charging equipment, repairs, storage and sales.

\* \* \*

STARTING AND LIGHTING TROUBLES, REMEDIES AND REPAIRS, by Harold P. Manly. Published by Frederick J. Drake & Co., Chicago; 459 pages, 4¼ by 6¾; very completely illustrated. Price \$3.

The electrical service station mechanic will find this volume a handy reference book, for in it are set forth systematic methods for quickly locating the exact form of trouble that may be present in automobile electric lighting and starting systems.

The book consists of three distinct parts:

First, trouble location charts which, when the condition of the lights and starter is observed, tell the steps necessary for finding fault and for correcting it.

Second, detailed instructions for making the correct tests to determine the kind of fault that may exist in any of the several parts of the electrical equipment. An explanation of the construction and use of electrical testing equipment for automobile work, is also included.

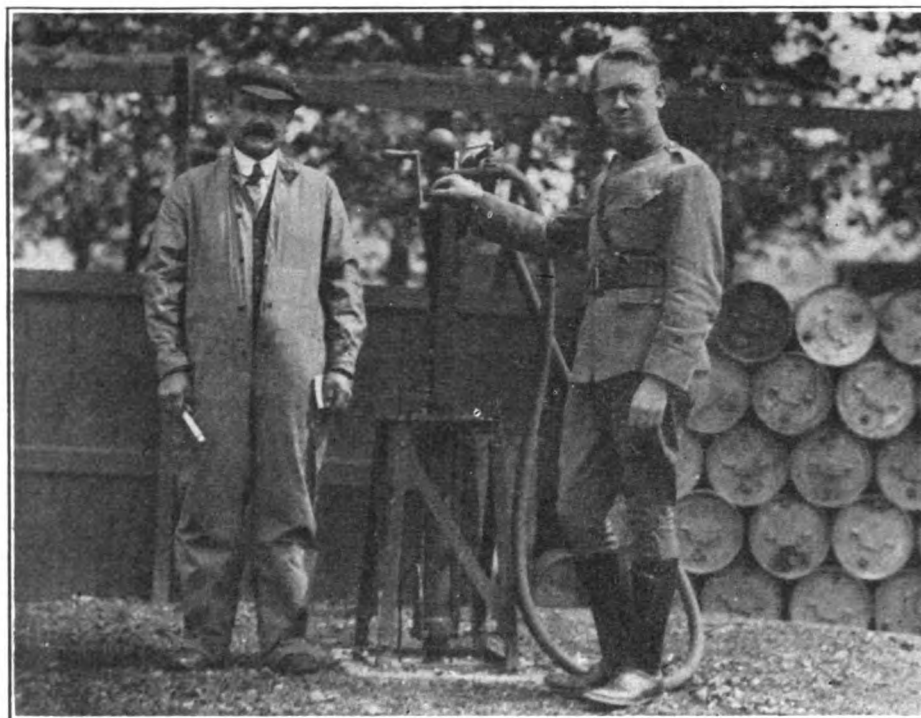
Third, diagrams of the wiring, both internal and external, are given. These diagrams show all the apparatus employed since such equipment came into use in 1912. They are especially drawn for use in this class of repair work and are made uniform in style and symbols throughout so as to be easily traced and understood.

### Paragraphs.

THE DOLE VALVE CO., 1923-1933 Carroll Ave., Chicago, announces that owing to its rapid growth and its desire to extend to its customers the best available service, it has been necessary to open up a new plant where, in connection with its executive offices, it will have adequate facilities for the manufacture of its line of double compression couplings, priming cups, shut-off cocks, packless radiator valves and brass fittings.

THE SUNDERLAND MACHINERY & SUPPLY CO., 1006-1008-1010 Douglas St., Omaha, Nebr., has a special automotive service department which specializes in cylinder grinding, crankshaft grinding, piston ring and pin grinding.

THE MILLER RUBBER CO., of Akron, Ohio, announces the opening of new factory branches at 1427-1433 Vine St., Philadelphia; 26-38 East Congress St., Detroit, Mich., and 21 West Fulton St., Grand Rapids, Mich.



The Only Gasolene Filling Stations of American Make in Paris Are Used in American Red Cross Garages.

mobile industry lies in quantity production as has been proved in America.

"Both American machinery and American products have been adopted by the leading manufacturers. In many cases even American men are being sought for executive positions."

Duratex is said to be the only coated fabric used throughout as standard equipment on any European car. Seventy-six automobile manufacturers throughout the world now use this product.

### American Service Stations Superior, Says Red Cross.

After all, there's nothing that quite takes the place of the American-planned service station.

So, at least, think the personnel of the transportation department of the American Red Cross in France. For a while they tried to put up with the French idea of such an institution, consisting of a stock of large galvanized containers from which the oil is poured directly into the automobile tank, but they missed the ease, speed and efficiency of the method they had been

ently located at various points about Paris, and receive their oil from the reserve supply kept at Parc des Princes.

### Book Reviews.

AUTOMOBILE BATTERY CARE AND REPAIR, by Harold P. Manly. Published by Frederick J. Drake & Co., Chicago; 335 pages, 4¼ ins. by 6¾ ins.; 160 illustrations. Price \$2.

Owners of battery service stations or garages doing battery repair work will find much of interest in this highly informative volume. It contains 12 chapters on the construction, action, care, and repair of storage batteries used with the lighting, starting and ignition system of modern automobiles. Over 150 charts and illustrations simplify the text and show accurately the details of a battery.

The first three chapters treat of the action, construction, capacity, life and efficiency of the up-to-date storage battery. The next four are related to the care and operating conditions of the battery troubles and remedies. The last five chapters contain valuable information about battery

Hickens "Sod-Tor-Lite" Set No. 2. 3 tools in 1. A self-shedding soldering iron, torch and lighter. Necessary in every shop. No torch to generate, Copper points heat in one minute.

POINTS FOR SPECIAL RADIATOR AND ELECTRIC WORK

ACETYLENE TORCH

TRY ONE

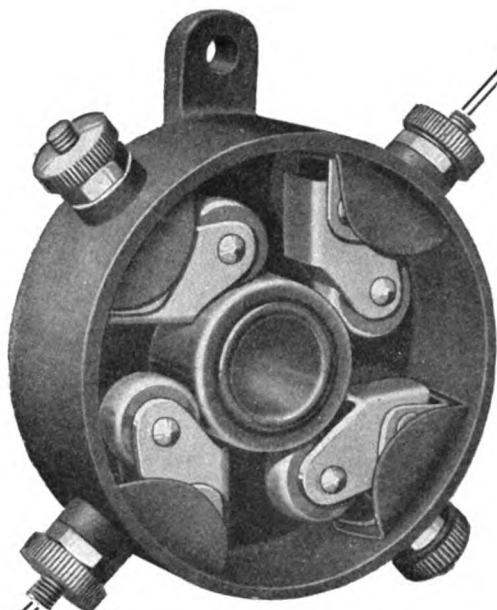
SATISFACTION GUARANTEED. SENT ON TRIAL. PRICED LOW. Write. B. E. HICKEN SOD-TOR-LITE CO. BOX Prairie Hill, Missouri #90

### KENNEDY Auto Storage Covers

furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

Made only by THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind. Canadian Branch Factory at Woodstock, Ont.





For Ford Pleasure Cars  
For Ford Trucks  
For Fordson Tractor

## A VITAL ORGAN

Likened to the heart of the human system, there is no unit more vital to the Ford ignition system than a dependable timer.

In all the simplicity of timer operation the slightest disorder means impaired ignition, resulting in misfires, lost power, wasted gas and the beginning of a score of motor troubles.

To overcome timer troubles and to insure perfect ignition an easy starting and a smoothly running motor, maximum efficiency and economy in fuel, we have perfected the new

### 1921 Model Duntley Four-Unit Timer

In this timer there is absolutely nothing to get out of order. Its sturdy construction, its self cleaning feature, its absolute insurance of equal spark duration in all four cylinders and the absence of any sliding grinding parts or delicate hammering contacts is your insurance against all timer troubles.

**GUARANTEED FOR ONE YEAR**  
**Regardless of Mileage or Service**

Dealers: Write or Wire for full details.

**J. W. DUNTLEY**

1004 Michigan Ave.

CHICAGO, ILL.

# Duntley Four Unit Timer



## Make Your Name Known In Oplex Letters of Light

**A**N Oplex Electric Sign with its raised, snow-white glass letters, gives an air of dignity to the whole front, no matter how plain and unassuming it may be. It creates an atmosphere in keeping with the product it advertises.

But this is only one of the things an Oplex Sign will do. The reason most sales agents and garage men install them is because an Oplex Sign is the quickest and most economical way of making the firm name known to the thousands who pass day and night, for Oplex Signs are day signs as well as night signs—raised, snow-white letters on a dark background.

We shall be glad to send you a sketch showing how your Oplex Sign will look.

**THE FLEXLUME SIGN CO.**

Electrical Advertising  
Niagara & Potomac Ave., Buffalo

Pacific Coast Distributors  
Electrical Products Corp.  
Los Angeles, Cal.

Canadian Factory  
The Flexlume Sign Co., Ltd.  
Toronto, Ont.

## Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

**Over 350,000 sets now in use**

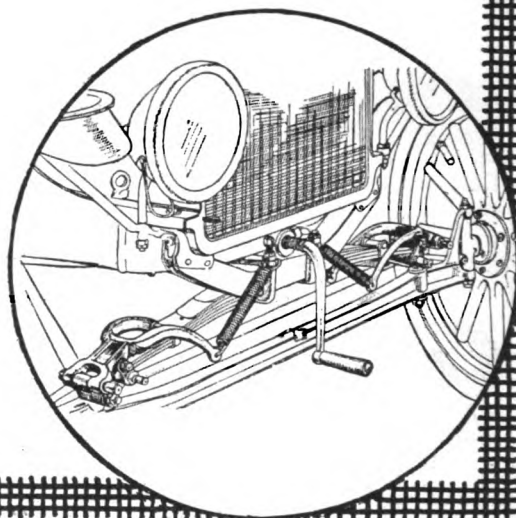
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

**Price \$12.00 per set of four.**

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

**P. H. Webber Company**  
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Chicago Sales Office:  
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.  
In Canada—RICHARD WILCOX CANADIAN CO., Ltd.  
London, Ont., Canada



## You get a good share of the profit.

The **MODEL "N" MARVEL CARBURETER** improves car performance, and increases mileage from 22 to 25 miles per gallon.

No changes are necessary to install it. Fits right in place of regular installation.

## MARVEL CARBURETER

*Designed especially for FORDS*

sold on 30 days' trial, with money back if not satisfactory.

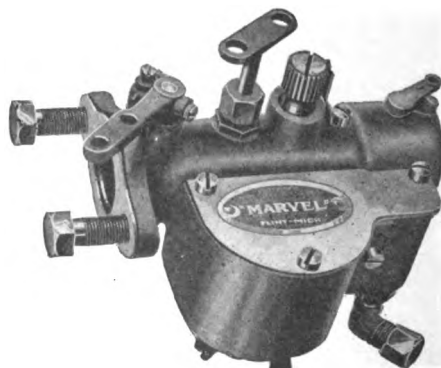
**Price F. O. B. Factory \$10.00**

**MODEL "E" CARBURETERS** are standard on Buick, Oakland, Nash, Scripps Booth, GMC, Wilson and all  $\frac{3}{4}$ -ton U. S. A. Government Trucks.

**MODEL "E" Carbureters** greatly improve Maxwell, Overland, and Studebaker cars.

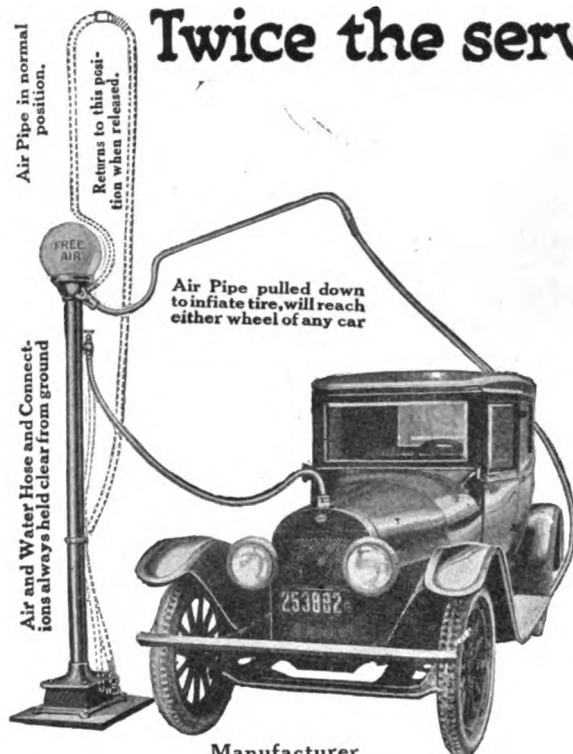
*DEALERS--If interested, write for further information*

**MARVEL CARBURETER COMPANY**  
FLINT, MICHIGAN, U. S. A.



# THE ROMORT AIR & WATER STATION

## Twice the service in half the time



Manufacturer  
**THE ROMORT MFG. CO.**  
Oakfield, Wis.

A glance at the illustration tells the story of the most appreciated air and water service on the market.

The kind that makes friends, builds business and fattens profits.

Write Us Today for Full Details

Sales Dept.  
**THE ZINKE CO.**  
1323 Michigan Ave., Chicago, Ill.

*"The Quality Remains Long After the Price Has Been Forgotten"*

# Giant Truck Tires and **Usaco** Air Compressors

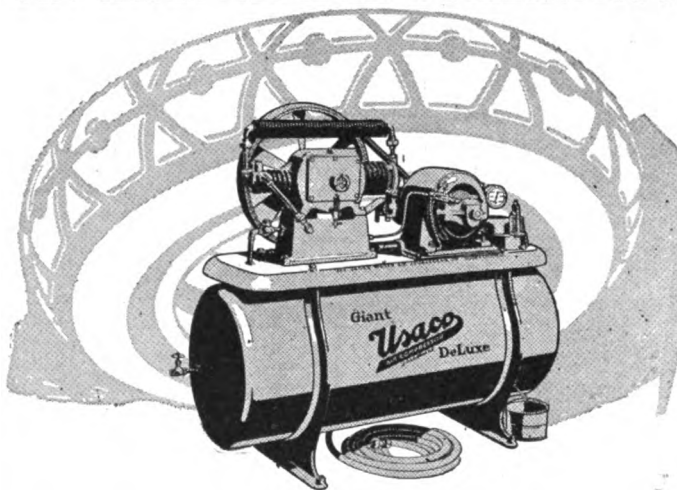
## AN INSEPARABLE COMBINATION

The **Usaco** AIR COMPRESSORS

Line contains both Two-stage and Single-stage Compressors, suitable for any garage air service that exists

In writing for literature and prices mention the name of your Jobber.

Inquiries desired regarding our plan of co-operating with Jobbers.



The USACO GIANT DE LUXE, capacity 7 cu. ft. per minute. Has 60 gallon tank tested to 500 pounds and suitable for working pressure of 250 pounds. Of the same general design as the Standard but with a greater capacity, having a more powerful motor and a tank with double the capacity.

Particularly adapted for the gruelling service encountered in inflating giant truck tires, a service which it handles with gratifying speed and ability. Also furnished in portable form. The USACO STANDARD DE LUXE, capacity 4 cu. ft. per minute. Has 30 gallon tank tested to 400 pounds and suitable for a working pressure of 200 pounds. A completely automatic unit of the highest quality. Furnishes high pressure air in great volume for tires of all sizes and pressures and is quiet running and foolproof.

Also furnished with 60 gallon tank or with wheels to provide portability.

**The United States Air Compressor Co.**  
Harvard Ave., CLEVELAND, O.

Give the AMERICAN GARAGE AND AUTO DEALER Credit With Writing Advertisers.

**G**IANT Pneumatic Tires have come to stay. Each day sees hundreds of trucks changed over to pneumatics and great numbers of truck owners seriously contemplating this progressive step.

However, even slight investigation reveals the fact that one cannot consider Giant Truck Tires without also considering improved conditions for inflating them, because the demands they present are so greatly in excess of the average as to be beyond the efficient handling of the ordinary air plant.

The Usaco Giant is just such a compressor, having been developed from the original Usaco Two Stage Compressor, specifically for Giant Tire Inflation, at the request of a number of largest tire companies. It exactly meets the needs of today with ample reserve volume and pressure for years of growth in air demands. It is quiet running and foolproof and embodies numerous improved and patented features including the Usaco Patented Unloader or Air Release which prevents burning out of motors.

Write for literature giving all the facts. You deserve the best and should not be satisfied with less. Your judgment in purchasing a Usaco will be backed by that of a majority of garages, tire shops and filling stations throughout the United States. And don't forget that there is only one Genuine Usaco Two Stage Air Compressor.

Please send literature advertised in American Garage and Auto Dealer to name written on margin. My Jobber is.....

# FINCK'S

**DETROIT SPECIAL  
OVERALLS & COMBINATION SUITS**

**The Garage Man's  
Most Popular  
Work Garment**

Slip into a Finck combination when next you need a work-suit. Note its generous fullness, its perfect design and the quality of material. You will see why Finck's are always preferred by men who put comfort, convenience and quality above price and save money by their policy. Most any good dealer can supply you, or write to us.

**W. M. FINCK & CO.**

**Detroit, Michigan**

**Manufacturers of High Grade Overalls,  
Men's and Women's Combination Work Suits**

**BRANCHES**

St. Louis, Mo.      Dallas, Texas  
Seattle, Wash.      Chattanooga, Tenn.  
Livingston, Mont.

(61)



## GANSCHOW GEARS

**for service and reliability**

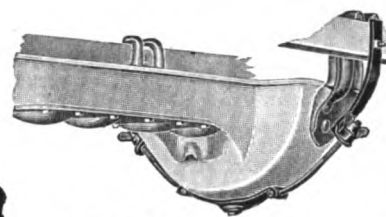
The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

Write today and feel free to consult our Engineering Department.

**Wm. Ganschow Company**

1002 Washington Boulevard  
Chicago, Illinois



Patented Sept. 11, 1917

## The JOHNSON Crank Case Support

**"The most essential equipment for  
Ford Car or Truck"**

**PREVENTS**

Breaking of Crank Case Arms  
Loose Crank Case Arms  
Oil Leaks      Vibration

Invaluable when a crank case arm is broken. Do not detach the broken arm—simply attach the Johnson Crank Case Support which will hold the engine firmly in place.

DEALERS—Here is a sure seller to every Ford owner. Write at once for full information

**C. R. BACKUS**

**MYSTIC**

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## Pondelick Brothers

**will pay \$100**

if they fail to duplicate any part of any make of automobile or truck foreign or domestic, submitted to them. That sum will be paid to the person sending the order.

Parts of any machine can be duplicated in 1 to 3 days' notice. All welding is done at their risk. Do not compare this work or welding with that of others. If you have a broken part or parts that others cannot weld or repair, send them to Pondelick's. They increase the durability of many parts—even where the manufacturers fail.



Supply your customers with "Pondelick's" anti-leak piston rings, and you insure them against engine trouble.

They have the largest and best equipped plants in the United States for the repair or reproduction of automobile parts.

Cylinder regrinding, new piston, special casting, heat treated, Pondelick's self-adjusting, anti-leak piston rings, new wrist pin, hardened and ground, bushing made of genuine bronze, including fitting and assembling of connecting rod to piston for \$15.00.

Reputation, not competition, determines our policies. Visit our plants and be convinced. Ask anywhere or anybody about our work.

General Factory, 5100 to 5112 West 16th St.  
Main Office, Leavitt St. and Jackson Blvd.

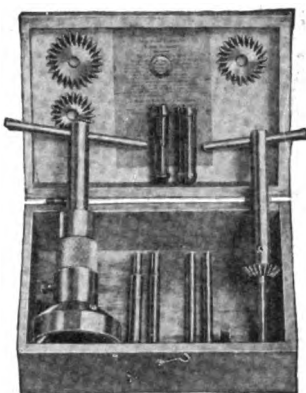
**Pondelick Brothers, CHICAGO ILLINOIS**



## A real friend of the garageman

### FOSNACHT VALVE RESEATER

The oldest valve seater on the market and still the leader. The quickest, most accurate and most dependable of them all. This compact dependable outfit will serve you long and well—and will pay for itself over and over again.



### Other PARO Garage Specialties

EKERN PORTABLE GARAGE GREASE GUNS  
EKERN PORTABLE WORK BENCH  
EKERN MOTOR STAND FOR FORD MOTORS  
EKERN EMERGENCY AXLES and AXLE STUBS

*Just Pure Gas*

Ask your jobber or write us for literature on this money-making equipment.

1412-14 S. Michigan Avenue,

CHICAGO, ILL.

## Make Your Motor Free from Carbon!

### CHASLER'S CARBON REMOVER

Give your motor a chance to work for you—to make your riding as full-powered, as enjoyable and economical as it can make it. Clear its cylinders of carbon!

Let us send you a can of Chasler's Carbon Remover—the harmless carbon eliminator that will completely relieve your motor of carbon deposits. A little of Chasler's Carbon Remover run through the carburetor ignites like gasoline and explodes evenly in all the cylinders, accelerating the motor and promptly clearing out every trace of the foe to motor health—carbon.

### Money Back Guarantee

If Chasler's Carbon Remover does not satisfy you, return at our expense, and your money will be refunded.

Price: \$5 per 1 Gallon Can  
\$3 per ½ Gallon Can

Order a can now—and give your motor a new lease of life. Send check, money order or draft.

DEALERS: Excellent territory open. Write us today.

P. J. CHASLER - - Suffern, N. Y.



## You Don't Guess the Answer You READ It on the Blade

Cylinder measurements guaranteed accurate to within .00025" and less.



### The AM-PÉ-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

Get the whole story in our Circular

PRICE \$2.50

**AM-PÉ-CO SALES CO.**  
MARSHALLTOWN, IOWA

## Air! the life of the tire depends on it

Do not be afraid to press the purchase of a  
**SCHRADER UNIVERSAL  
TIRE PRESSURE GAUGE**  
on a customer.

He will thank you for it after he discovers the saving in both tires and gasoline that it makes possible.

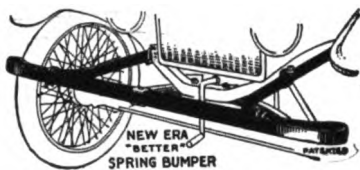
Price \$1.50

**A. Schrader's Son Inc.**  
783 Atlantic Ave., Brooklyn, N.Y.



100 PER CENT SATISFACTORY  
**"Better" Spring Bumpers for All Fords**

**DOUBLE  
BARS  
OF  
DOUBLE  
STRENGTH**



A modern one—first of all—that is easily—quickly attached—without drilling or cutting—and which stays put—without rattle or vibration.

It is also 100% interchangeable, black or nickel front or rear. The bars can be used for any other car by obtaining suitable attaching arms.

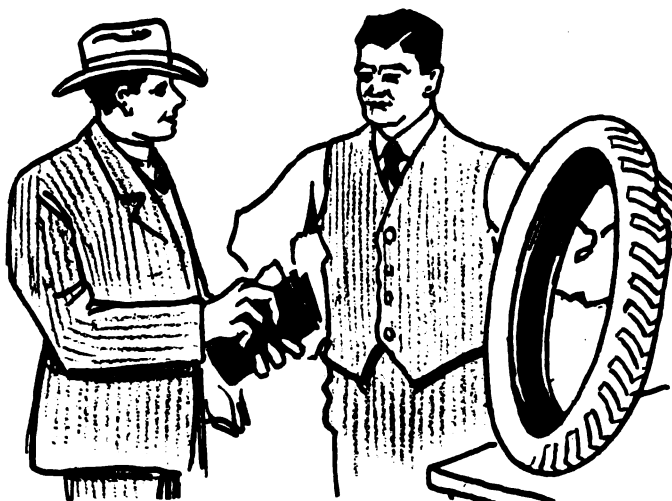
Many thousand dealers always readily obtain full list price and help increase the growing output of New Era "BETTER" Accessories. Are you—will you be a New Era dealer and help your own "BETTER" business prestige?

The most complete showing of detachable arms for all cars—front and rear—in valuable date catalog, free to all. A money maker of more Bumper sales. It also shows "BETTER" Tire Carriers and Springs for all cars. "BETTER" than "just-as-good".

Get that catalog.

**NEW ERA SPRING & SPECIALTY CO.**

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**OUR REMADE TIRES**  
**Save Money for Car Owners**

By giving them 5000 or more additional miles at a moderate cost. No matter if your tires are punctured, sand-blistered, rim-cut, or blown-out—send them to us. We remake them by a process that gives them more mileage than many of the new tires sold nowadays.

**DEALERS**—We have an interesting proposition for you. Write today for full particulars.

**LEO McDANIEL RUBBER CO.**

804 Commercial Ave.

Cairo, Ill.

**Brunswick  
TIRES**

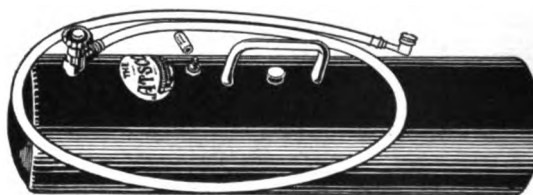
SOLD ON AN UNLIMITED MILEAGE GUARANTEE BASIS

*"It's not the name that makes the Tire famous—  
 Brunswick Tires help keep the name famous."*

The Brunswick is a composite of every sound principle of tire-making. Just as a well-built chain is composed of links of equal strength, so in Brunswick Tires no essential feature has been over-emphasized at the expense of any other. The Brunswick is the final and ultimate type of tire.

**THE BRUNSWICK-BALKE-COLLENDER CO.**

General Offices: 623-633 So. Wabash Ave., Chicago  
 Branches in principal cities of United States and Canada



**You Save Time With the ATSCO**

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

**Air-Tight Steel Tank Company**

Pittsburgh, Pa.

**AUTOMOTIVE "EQUIPMENTLY" SPEAKING**

OUR LOCATION HAS ENABLED US TO BECOME  
 QUICK SHIPPERS

IN EQUIPMENT. REPAIR MACHINERY AND ACCESSORIES  
 FOR THE "BIG FIVE"

Motor Car--Motor Truck--Tractor--Motor Boat--Aeroplane

WE ARE TERRITORIAL DISTRIBUTORS FOR

Service Station Equipment Co. Inc., of Chicago, Ill.  
 "AMBU" Battery Station Appliances  
 Firestone Demountable Rims.

ESTABLISHED 67 YEARS

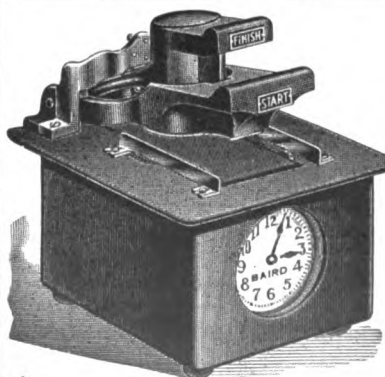
**BECK & CORBITT**

AUTOMOTIVE EQUIPMENT

1222 to 1244 North Main Street

ST. LOUIS, U. S. A.

Put your repair charges on a  
 profitable basis with



**BAIRD  
TIMING  
DEVICES**

Keep a check on your employees' time and learn exactly what each job costs. Automatic supervision turns losses into profits.

Prices moderate.  
 Write today for booklet.

**Baird Equipment Co.**  
 324 W. Ohio St., Chicago  
 Phone Superior 2071

## ALUMINUM SOLDER

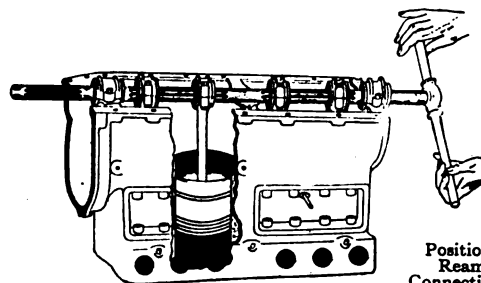
Repair aluminum parts with ease and in a highly satisfactory manner with our MASCO SOLDERING OUTFIT No. 5 consisting of

One pound solder  
One wire brush  
One puddling rod  
and full directions

PRICE \$4.00

*Write for our catalog containing full details on brazing, soldering, lead burning and welding torches.*

**St. Paul Welding & Mfg. Co.**  
175 West Third St. St. Paul, Minn.



Position for Reaming Connecting Rods

## The First Three Jobs Pay for this LEWIS REAMER

It only takes an hour and a half to ream the seven bearings in a Ford motor as against eight hours by the hand method. Your profit is further increased by the fact that you do not need an expert mechanic to operate your Lewis Reamer. Moreover you get a 100% perfect job every time and your customer is sure to be satisfied.

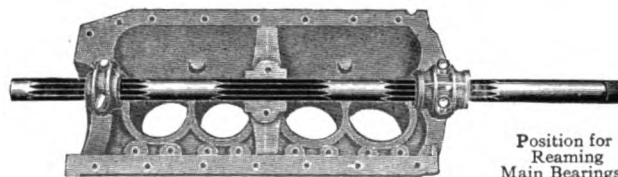
The Lewis Combination Aligning Reamer works equally well on full or undersized bearings.

Ask your jobber or write us for full details.

**LEWIS TOOL COMPANY**

612 Fifth Ave. South

Minneapolis, Minn.



Position for Reaming Main Bearings

## HOLD 'EM IN THE ROAD

Gives the Ford driver better control over his car, preventing breakage, repairs and accidents.

Combines four valuable attachments in one—Radius Rod Brace, Anti-Rattler, Axle Support and Steering Device.

DEALERS—This is the most essential of all Ford necessities. Ask your jobber or write for particulars.

**CASCO MFG. CO.**  
THOMASVILLE, GA.

Other "CASCO" Products

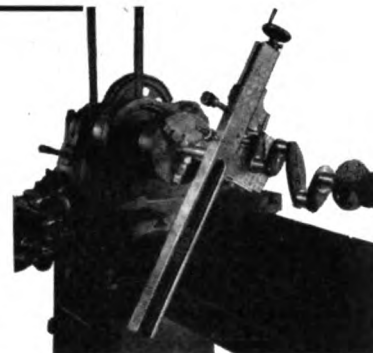
"CASCO" Fan Belt Guide

"CASCO" Oil Drain Cock

"CASCO" Ford Cofl Box Protector

No Filing  
No Offsetting  
No Jigs

The Weber Tool turns ALL Pins from ONE setting of the Crank Shaft, ON CENTERS. It is the only Tool of its kind that will leave a pin absolutely parallel to the main bearings. The cutter used is a Forming Tool, cutting entire width of pin at once. A micrometer dial enables operator to gauge his cuts and turn all pins to a uniform size.



Perfected and Proven

## Weber Crank-Pin Re-Turning Tool

How many times have you assembled a gas engine, knowing full well that the crank shaft needed truing up? You did not want to send it out and delay your customer. You knew, too, that it would cost considerable to have it done.

With the Weber Tool you can do this work whenever necessary. NO DELAY—NO EXPENSE.

Why not do this work in your shop and have more satisfied customers and put more profits in your own pocket?

The Weber Tool is guaranteed to turn crank-pins within as close limits of accuracy as any other known method.

Picture at top shows Weber Tool in operation on 4-throw Crank Shaft. All four pins are turned and finished from this one setting. Write for Circular and prices or ask your jobber.



**Sawyer-Weber Tool Mfg. Co.**  
356 South Alameda Street  
Los Angeles, Cal.

**When Springs Break, put on**

**VULCAN**  
The Replacement Spring

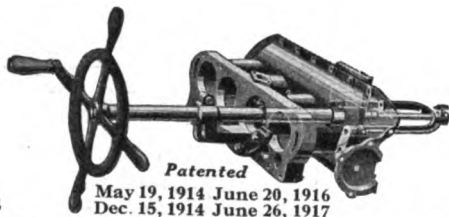
Our metal nameplate is on every genuine VULCAN spring for your protection.

If your jobber cannot supply you, write us—today.

**JENKINS VULCAN SPRING CO.**  
Richmond, Indiana.

**REPAIRMEN—NOTICE!**

The Heiser  
Improved  
Cylinder  
Reboring  
Tool for  
Ford Motors



Patented  
May 19, 1914 June 20, 1916  
Dec. 15, 1914 June 26, 1917

is the only Reboring Tool in the world that is self sharpening. It is the only Tool except expensive grinders that will not leave the finished cylinder slightly tapered toward the bottom. It is the only Tool that rebores between centers—this insures a finished cylinder, square with the crankshaft, round, straight and true. It is adjustable, and the only Tool that will rebores different sizes without losing the adjustment.

**PRICE \$56.00** A money-back guarantee with each machine.

Name your jobber and write today for full particulars.

Heiser Special Tool Co., 2001-21 Washington St., Kansas City, Mo.

**HARNER'S ALUMIFLUX REPAIRS ALL METALS**

All repairs can be made with ALUMIFLUX without removing the part from the car. ALUMIFLUX will work successfully with aluminum, copper, iron (gray, malleable, or galvanized), tin, zinc, lead or brass.

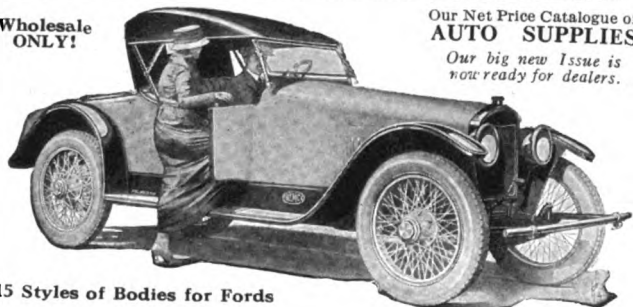
Not affected by gasoline, oil or water, hot or cold. Will stand heat up to 600 degrees and pressure to 250 pounds.

Write for full particulars

**E. C. HARNER MFG. CO.**  
BENTON HARBOR MICHIGAN

**Send for "The Little Salesman"**

Wholesale  
ONLY!



Our Net Price Catalogue of  
**AUTO SUPPLIES**  
Our big new Issue is  
now ready for dealers.

15 Styles of Bodies for Fords

Make Money Equipping old FORDS with these classy "Fidelity Bodies" listed in "THE LITTLE SALESMAN" \$50 AND UP

NEW ENGLAND MILLS CO., 1027 W. VanBuren St., Chicago

**Atlas Crankshaft Grinder**

Don't attempt to scrape a bearing to crank pin that has worn oval and don't pay a machine shop \$15 or \$25 for a lathe job. Buy an

**Atlas Abrasive Tool**

It will true up a crankshaft to less than one-thousandth of an inch in less than one hour without removing shaft from crankcase. Adjustable to all crank pins from 1 1/2 to 2 1/2 in. diameter. But one tool needed, cutters good for truing 10 to 20 pins. Use same bearings, just enough is removed to true. Rebabbiting unnecessary. 5000 in use.

Send for Atlas Garage Unit information. A machine for testing and straightening crankshafts. Gear press with housing assembly and piston vice attachments.

**ATLAS MANUFACTURING COMPANY**

702 N. Canal St.

Pittsburgh, Pa.



Price complete, \$10.00  
net. Prepaid.  
Extra cutters 30 cents each.

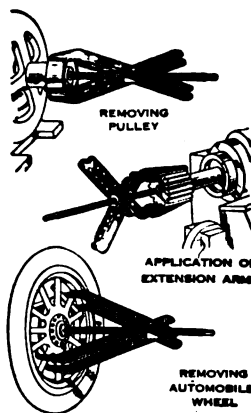
**America's Aviators Used**

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## High Compression PISTON RINGS

*The Standard of Efficiency*

BURD HIGH COMPRESSION RING CO. Rockford, Ill.

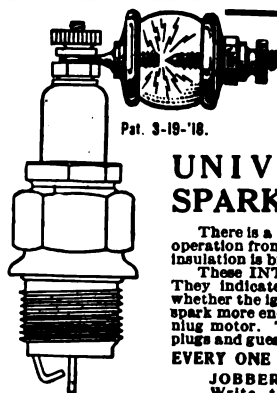
**"LITTLE GIANT" GEAR AND WHEEL PULLER**

Pulls any gear, wheel or pulley anywhere in a jiffy. Built on the only correct principle. Produces maximum efficiency with minimum effort. Can't twist off or let go. THE HARDER THE PULL—THE TIGHTER THE GRIP. Reduces operating cost and increases the earning capacity of any Repair Shop. Made from best grade drop forge steel. Almost unbreakable. Adjustable up to 13 inches diameter. Satisfaction guaranteed or money refunded. Order or write for details today. Price complete with extension arms, \$12.00.

Liberal Discounts to Dealers.

**Premier Motor Products Co.**

3954 North Robey Street Chicago, U. S. A.



Pat. 3-19-18.

**Spark Plug Troubles Are Rare Occurrences**

on the car equipped with

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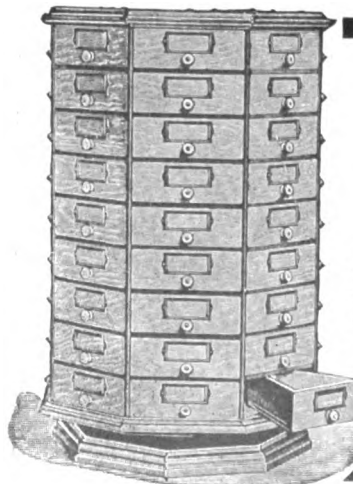
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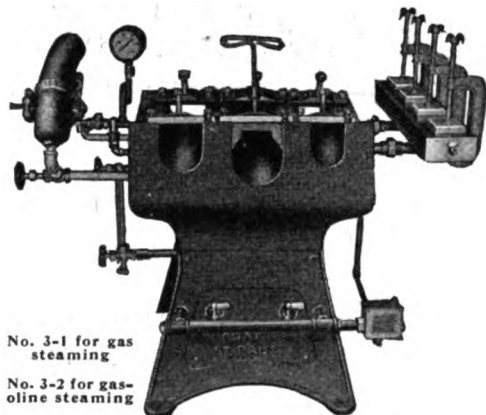
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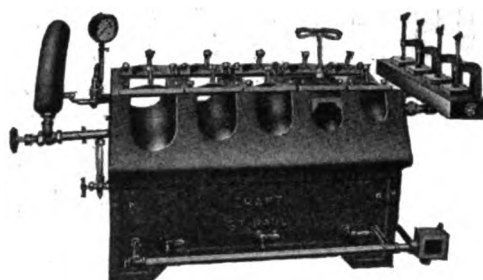
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Apco Mfg. Co., Providence, R. I.  
Beck & Corbitt Iron Co., 1222 No. Main St., St. Louis, Mo.  
Casco Mfg. Co., Thomasville, Ga.  
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New England Mills Co., 1027 W. Van Buren St., Chicago.  
New Era Spring and Specialty Co., Grand Rapids, Mich.

## AIR COMPRESSORS

Brunner Mfg. Co., Utica, N. Y.  
Champion Pneumatic Machinery Co., 1402 S. Michigan Ave., Chicago.  
Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.  
General Utility Co., 1324 Ogden St., Philadelphia, Pa.  
Globe Mfg. Co., Battle Creek, Mich.  
U. S. Air Compressor Co., 5308 Harvard Ave., Cleveland, O.

## AIR TANKS

Air Tight Steel Tank Co., Pittsburgh, Pa.

## ALIGNING REAMERS

Lewis Tool Co., 612 5th Ave. So., Minneapolis, Minn.

## APRONS

Bailey-Drake Co., 1120 So. Michigan Ave., Chicago.

## AUXILIARY STEERING EQUIPMENT

Casco Mfg. Co., Thomasville, Ga.  
Meixell Co., Indianapolis, Ind.

## AXLES (EMERGENCY)

Green Engineering Co., Dayton, Ohio.  
H. G. Faro Co., 1410 S. Michigan Ave., Chicago.

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Graham Roller Bearing Co., Coudersport, Pa.  
The Norma Company of America, 1700 Broadway, New York City.

## BODIES

New England Mills Co., 1027 W. Van Buren St., Chicago.

## BODY CLEANERS AND POLISHES

Davies-Young Soap Co., Dayton, Ohio.

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## BUMPERS

New Era Spring & Specialty Co., 1152 Hamilton Ave., Grand Rapids, Mich.

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American Bolt & Screw Case Co., Dayton, Ohio.

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P. J. Chasler, Suffern, N. Y.

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## CLEANSERS

States Chemical Co., 680 W. Austin Ave., Chicago.

## CONNECTING RODS

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Green Engineering Co., Dayton, Ohio.

## COVERS

Kennedy Car Liner & Bag Co., Shelbyville, Ind.

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Storm Mfg. Co., Minneapolis, Minn.

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Am-pé-co Sales Co., Marshalltown, Iowa.

## ENGINES

Auto Engine Wks., St. Paul.

## ENGINE CLEANERS

Wagner Specialty Co., 1902 Broadway, New York.

## FAN BELTS

Premier Motor Products Co., 3945 No. Robey St., Chicago.

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Casco Mfg. Co., Thomasville, Ga.

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Flexlume Sign Co., Niagara St., Buffalo, N. Y.

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Becker Bros., 23-25 N. Jefferson St., Chicago, Ill.  
Beckley-Ralston Co., 1801 S. Michigan Ave., Chicago, Ill.  
Eclipse Valve Grinder Co., Dept. C., 20th St. at Oak, Kansas City, Mo.  
Fairbanks Co., New York City.  
W. M. Finch & Co., Detroit, Mich.  
General Utility Co., 1324 Ogden St., Philadelphia, Pa.  
E. C. Harner Mfg. Co., Benton Harbor, Mich.  
B. E. Hicken Sod-Tor-Lite Co., Box 490, Prairie Hill, Mo.  
The Imperial Brass Mfg. Co., 1224 W. Harrison St., Chicago, Ill.  
H. G. Faro Co., 1410 So. Michigan Ave., Chicago.  
Lewis Tool Co., 612 5th Ave. Co., Minneapolis, Minn.  
Marvel Machinery Co., Minneapolis, Minn.  
Romort Mfg. Co., Oakfield, Wis.  
St. Paul Welding & Mfg. Co., 172 West Third St., St. Paul, Minn.  
Sawyer-Weber Tool Mfg. Co., 356 S. Alameda St., Los Angeles, Cal.  
Storm Mfg. Co., Minneapolis, Minn.  
Testall Elect. Mfg. Co., San Antonio, Texas.  
Washburn Burner Corp., Kokomo, Ind.  
Zinke Co., The, 1323 So. Michigan Ave., Chicago.

## GASOLINE PUMPS AND TANKS

General Utility Co., 1324 Ogden St., Philadelphia.  
Milwaukee Tank Works, Milwaukee, Wis.  
Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.

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Automotive Material Co., 208 North Wabash Ave., Chicago, Ill.  
Universal Gasoline Purifier Co., 258 Main St., Buffalo, N. Y.

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William Ganschow Co., 1008 W. Washington St., Chicago.

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Premier Motor Products Co., 3945 No. Robey St., Chicago.

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Frank Rose Mfg. Co., Hastings, Neb.  
H. G. Faro Co., 1410 So. Michigan Ave., Chicago.

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Leoric Mfg. Co., Springfield, Ill.

## LENSES

C. A. Shaler Co., 373 Fourth St., Waupun, Wisconsin.

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Elgin Motor Car Corp., Argo, Ill. (Suburb of Chicago.)

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National Refining Co., 2003 Rose Bldg., Cleveland, Ohio.

## OIL DRAIN COCKS

Casco Mfg. Co., Thomasville, Ga.

## OIL PUMPS AND TANKS

General Utility Co., 1324 Ogden St., Philadelphia, Pa.  
Milwaukee Tank Works, Milwaukee, Wis.  
Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.

## PISTONS

Am-pé-co Sales Co., Marshalltown, Iowa.  
Green Engineering Co., Dayton, Ohio.  
Marvel Machinery Co., Minneapolis, Minn.

## PISTON RINGS

Bailey-Drake Co., Inc. (Sales Dept. for Trione Piston Ring Co.), 1120 S. Michigan Ave., Chicago.  
Burd High Compression Ring Co., Rockford, Ill.  
Butler Mfg. Co., Indianapolis, Ind.  
Ever-Tight Piston Ring Co., 1609 Kingsland Ave., St. Louis.  
General Utility Co., 1324 Ogden St., Philadelphia, Pa.  
Green Engineering Co., Dayton, Ohio.  
Fendelick Bros., Leavitt St. and Jackson Blvd., Chicago.  
Steel Spring Piston Ring Co., 145 Metropolitan Ave., Brooklyn, N. Y.

## PUMPS

Air-Tight Steel Tank Co., Pittsburgh, Pa.  
Frank Rose Mfg. Co., Hastings, Neb.  
Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.  
Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

## SCHOOLS OF MOTORING

Greer College of Motoring, 1519 So. Wabash Ave., Chicago.

## SHOCK ABSORBERS

Channon-Hughson Co., 229-233 W. Erie St., Chicago.  
Philip H. Webber & Co., Hoopeston, Ill.

## SIGNS

Federal Electric Co., Lake & Desplaines Sts., Chicago.  
Flexlume Sign Co., Niagara St., Buffalo, N. Y.

## SOLDERING FLUX

M. W. Duntion Company, Providence, R. I.  
E. C. Harner Mfg. Co., Benton Harbor, Mich.

## SOLDERING OUTFITS

M. W. Duntion Co., The, Providence, R. I.  
St. Paul Welding & Mfg. Co., 175 W. Third St., St. Paul, Minn.

## SPARK PLUG INTENSIFIERS

Universal Mfg. & Sales Co., 552 W. Harrison St., Chicago.  
All Spark Ignition Co., 13 Water St., New York.

## SPRINGS

Garden City Spring Works, 2800 Archer Ave., Chicago.  
Harvey Spring & Forging Co., Racine, Wis.  
Jenkins Vulcan Spring Co., 1462 Chestnut St., St. Louis.  
New Era Spring and Specialty Co., Grand Rapids, Mich.

## TESTING INSTRUMENTS

H. E. Phillips & Co., Union City, Ind.  
Weston Electrical Instrument Company, Newark, N. J.

## TIMER

J. W. Duntley, 1011 Michigan Ave., Chicago, Ill.

## TIMING DEVICES

Edrd Equipment Co., 324 W. Ohio St., Chicago.

## TIRES

Brunswick-Balke-Collender Co., 623-633 S. Wabash Ave., Chicago, Ill.  
Leo McDaniel Rubber Co., Cairo, Ill.

## TIRE PROTECTORS

Coffield Tire Protector Co., 31 Court St., Dayton, Ohio.

## TIRE PRESSURE REGULATORS

Automatic Safety Tire Valve Co., 1753-1755 Broadway, New York City.

## TIRE REPAIR EQUIPMENT

Atlas Auto Supply Co., 680 W. Austin Ave., Chicago, Ill.  
C. A. Shaler Co., Waupun, Wis.  
Zinke Co., 1323 So. Michigan Ave., Chicago.

## TIRE RENEWING AND EQUIPMENT

Leo McDaniel Rubber Co., 304 Commercial Ave., Cairo, Ill.

## VALVES

Romort Mfg. Co., Oakfield, Wis.  
A. Schrader's Son, Inc., 782-798 Atlantic Ave., Brooklyn, N. Y. (Automatic Inflating Valve)

## VULCANIZERS

C. A. Shaler Co., 353 Fourth St., Waupun, Wis.  
Wood-Craft Co., 1485 Marshall Ave., St. Paul, Minn.

## WELDING EQUIPMENT

The Imperial Brass Mfg. Co., 1224 W. Harrison St., Chicago, Ill.  
St. Paul Welding & Mfg. Co., 172 W. Third St., St. Paul, Minn.  
Washburn Burner Corp., Kokomo, Ind.

## WIRE AND TERMINAL GUARDS

J. W. Duntley, 1011 Michigan Ave., Chicago, Ill.

## WRECKING TRUCKS

Robt. Holmes & Bro., Danville, Ill.

## WRENCHES

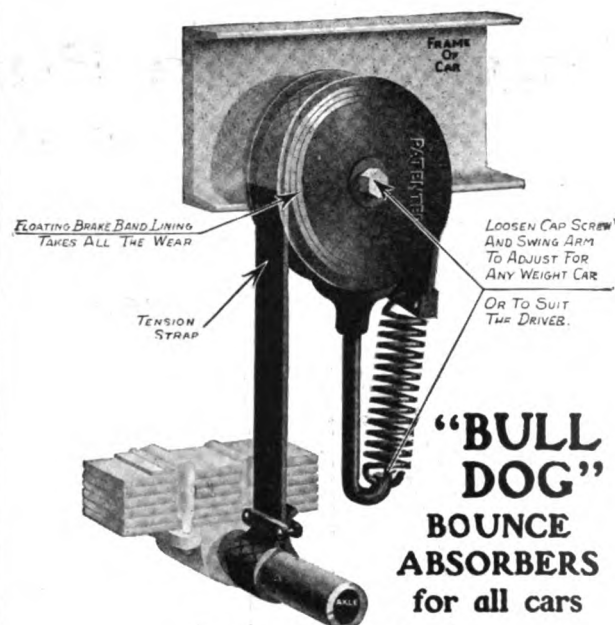
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The Graham Roller Bearing Co., Coudersport, Pa.



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 MANUFACTURERS AND SPRING SERVICE  
**GARDEN CITY SPRING WORKS**  
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Wonderful opportunities await the dealer who has not yet stocked up on this fast seller. The "BULL DOG" Bounce Absorber is the only device of this character that can be adjusted easily to the requirements of the different weights of cars or driver's style of driving. No metal parts to wear and no oil necessary. A car equipped with "BULL DOG" Bounce Absorbers gets better tire service, more mileage on gasoline and is proof against broken springs.

DEALERS—Get your territory supplied.

**CHANNON-HUGHSON COMPANY**

229-233 W. Erie St., Chicago, U. S. A.

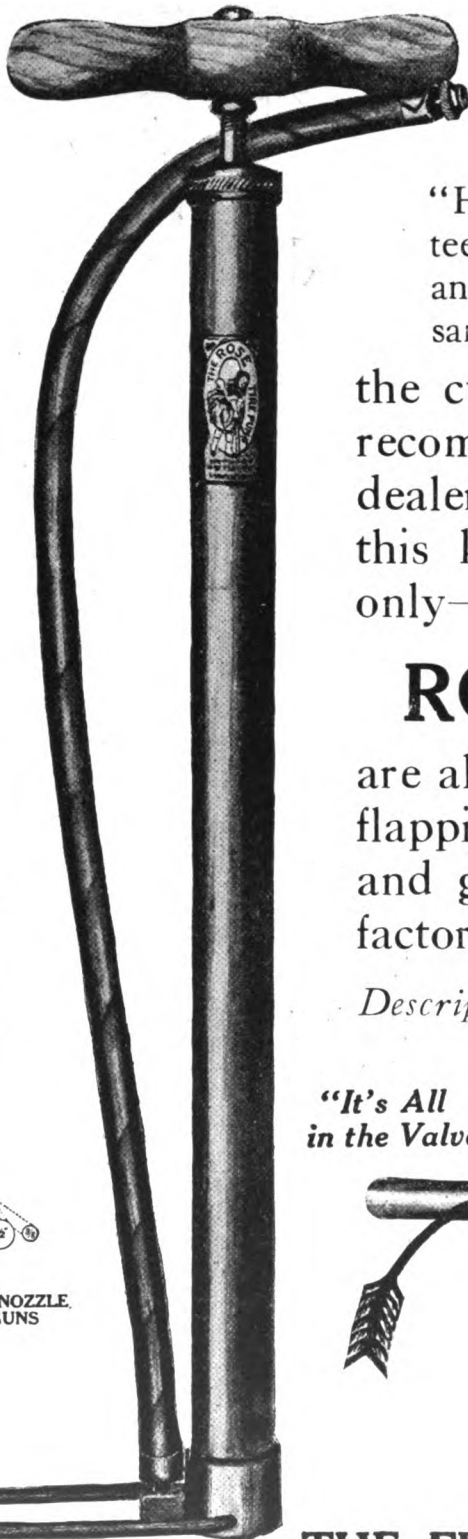
## MILWAUKEE OUTFITS for GASOLINE and OIL



**34 TYPES TO SELECT FROM**  
 ::  
**LABELED BY THE UNDERWRITERS LABORATORIES**  
 ::  
**UNDERGROUND "KANT-LEEK" TANKS - 60 TO 12000 GALLONS**  
 ::  
**SPECIAL PROPOSITIONS TO JOBBERS**  
 ::  
**WRITE TO DAY FOR CATALOG "9"**

**MILWAUKEE TANK WORKS**  
 MILWAUKEE, U.S.A.

# Buying Tire Pumps Is a Matter of Business with the Dealer



When the dealer can say to his prospective tire pump customer:

"Here is a Tire Pump that is guaranteed by the manufacturer for five years and I will guarantee it to you for the same length of time"—

the customer buys the pump on the recommendation of his dealer. The dealer sells the tire pump that gives this kind of service for one reason only—it's a matter of business.

## ROSE TIRE PUMPS

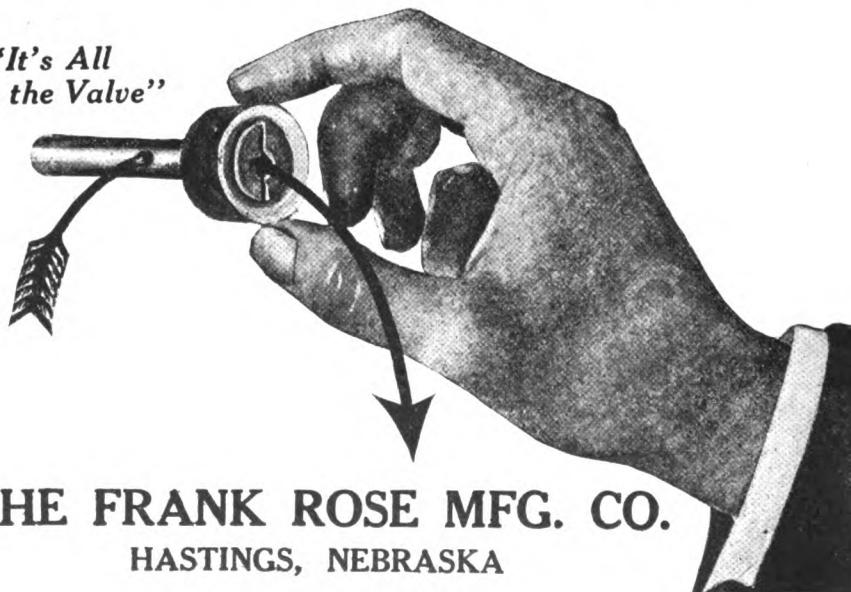
are all steel construction—with patent flapping valve, admitting more air—and giving the user five years' satisfactory service.

*Descriptive matter and Catalog sent on request.*



ROSE TAPER NOZZLE.  
GREASE GUNS

*"It's All  
in the Valve"*



**THE FRANK ROSE MFG. CO.**  
HASTINGS, NEBRASKA

(Formerly J. H. HANEY & CO.)

# CHAMPION AIR COMPRESSORS

## Serve best for every purpose

**T**HE requirements of air service vary with locality and other conditions. Whatever type of air outfit you need you will find your logical choice in the CHAMPION line. We are now manufacturing CHAMPION Air Compressors in a number of types—each of several different capacities. So we are enabled to take care of all requirements.

CHAMPION supremacy in the air compressor field is secured through the following features:

- (1) **CYLINDERS and VALVE HEADS** are cast integral. Cylinders are cast steel removable from crank case.
- (2) **VALVES:** Mushroom type housed in bronze cages. Special arrangement for regrinding.
- (3) **MAIN BEARINGS:** Annular ball bearing type which reduces friction and assures easy running, long life and saving of power.
- (4) **CRANK SHAFT:** High grade carbon steel, drop forged  $1\frac{1}{4}$ " in diameter.
- (5) **CONNECTING ROD BEARING:** Bronze back, lined with highest grade anti-friction babbit metal.
- (6) **WRIST PIN:** Chrome nickel steel hollow, hardened and ground, securely fastened with set screw.
- (7) **CONNECTING ROD:** I-beam type with inserted wrist pin bushing.
- (8) **CONNECTING ROD SHIMS:** Of "laminated" brass durable and easily adjusted to take up any wear.
- (9) **LUBRICATION:** Automatic splash insures perfect lubrication.
- (10) **FLY WHEELS:** Balanced crowned fan blade type of ample size to assure perfect cooling.
- (11) **AUTOMATIC PRESSURE RELEASE:** Eliminates the cause of burned out motors, fuses, etc.

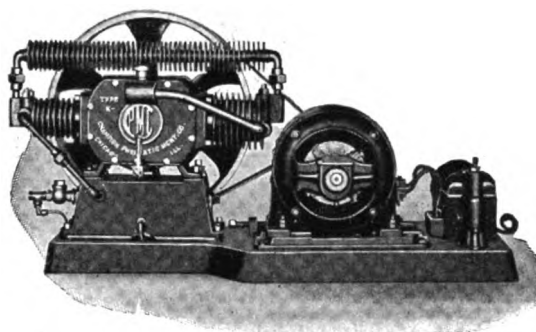
Champion Air Compressors are backed by a liberal guarantee. They are ready for prompt delivery. Write for complete information.

## CHAMPION PNEUMATIC MACHINERY COMPANY

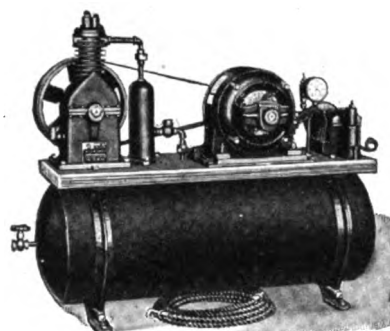
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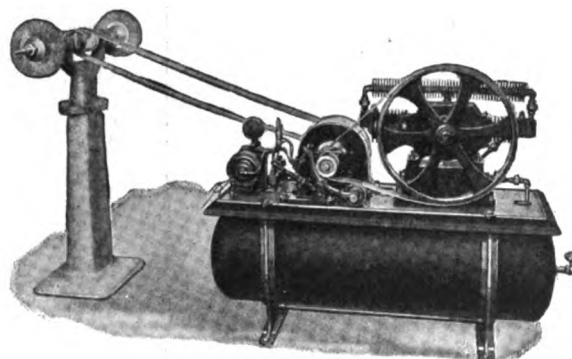
Champion Special Equipment K-113



Equipment With Automatic Controller K-111



Single Stage Automatic Air Unit S-121



Champion Combination K-115



## "GET ME SOME NOKORODE SALTS-

You are having me use Nokorode Paste and are giving me Sal-Ammoniac to tin and keep my irons clean.

Anybody in the shop will tell you that Sal-Ammoniac, if spattered on the work, will cause as much corrosion as if you fluxed the metal with acid.

A can of NOKORODE Salts is one investment that will pay—I can cut NOKORODE thirty-two parts water to one part Salts which will make four gallons of the best tinning and cleaning solution for soldering irons that is made.

The regular supply store where we do most of our buying has this in stock. Don't go anywhere else because they may try to give us a substitute, and there is no other on the market that will take its place, as NOKORODE is not made down to a price but up to a standard, and is sold under a money back guarantee by the makers."

## THE M. W. DUNTON COMPANY

PROVIDENCE, R. I., U. S. A.



Reg. U. S. Pat. Off.

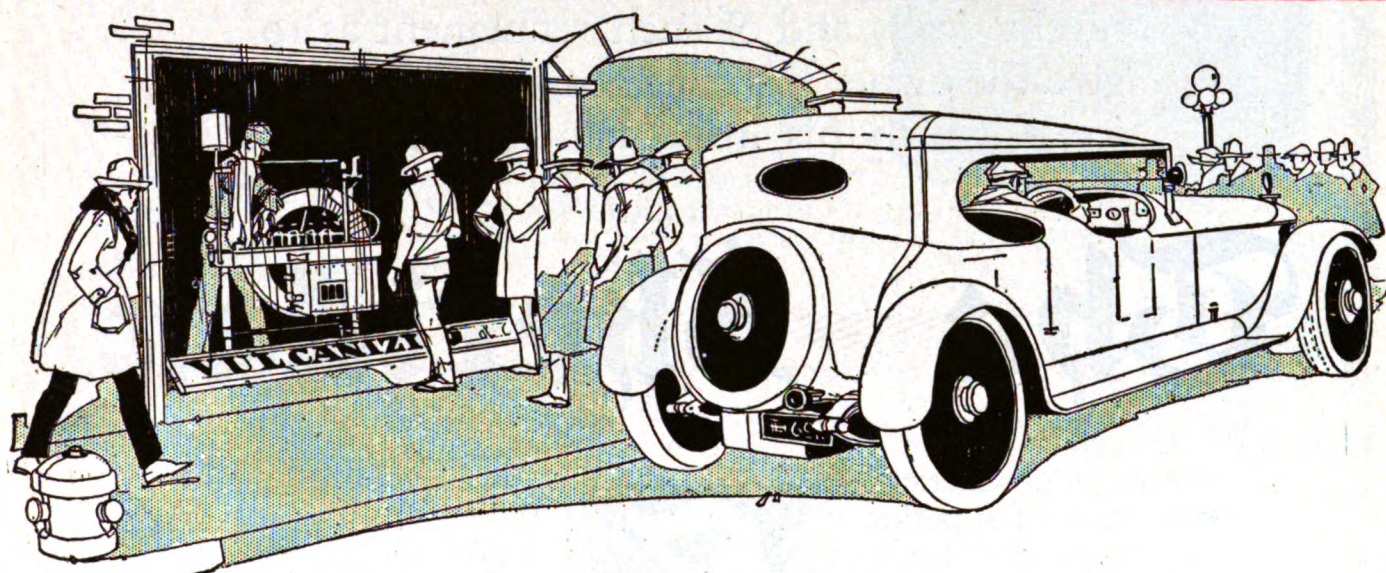


# American Garage & Auto Dealer

Published Monthly  
116 So. Michigan Ave.  
CHICAGO, ILL.

SEPTEMBER 1920

Vol. 11—No. 9.  
10 Cents the Copy  
\$1.00 Per Year.



## Make Dull Months Busy Ones

Keen-minded garagemen everywhere are installing SHALER Vulcanizers—keeping busy the year 'round—increasing their business and making much more money. This big opportunity is open to every garageman—to make dull months busy and profitable ones and to make more money.

## SHALER Shop Vulcanizer

is the standard vulcanizing plant for garages and tire repair shops. With this vulcanizer you can make every casing and tube repair that you care to make. The Improved Wrapped-Tread Method which it uses enables you to repair casings quicker, better and at less cost than by any other method.

The SHALER takes up no more room than a

bicycle. A boy can learn to operate it. Can be had equipped for gas, gasoline or electricity. Each model has Automatic Heat Control, which saves time, makes it **safe**, and prevents overcuring or undercuring tires.

The complete SHALER Vulcanizing Plant—with all necessary tools, materials, and full instructions costs less than \$100.

### Order From Your Jobber Now

Don't pass this opportunity of making big money, especially during the "dull" months. Your jobber can make prompt shipment of a SHALER if you order now. Write him for full information—write us for Free Book, "How to Open a Tire Repair Shop" and catalog of the complete line of SHALER steam, gasoline, electric and dry fuel Vulcanizers for garages, tire repair shops and motorists' use.

**C. A. SHALER COMPANY, 358 Fourth St., Waupun, Wis.**  
*Oldest and Largest Manufacturers of Vulcanizers in the World*



# A Declaration

In the Sheridan—the latest unit of the General Motors group—we pledge to the trade a car so complete in every detail, of such abundant power, so sound mechanically and of such refinement as to give the owner the constant, satisfying service to which his investment entitles him.

## The Sheridan

is now in production. It is a car of superior qualities—better built, better trimmed and better finished—yet selling at a moderate price. The work of planning, designing and refining, extending over a period of many months, is the outgrowth of automotive experience covering the life of the industry. The results are evident in a car of beauty, stabil-



ity and completeness. No detail that will serve to insure easy driving—comfortable riding—efficient upkeep and extra years of service has been omitted. The Sheridan is a *finished* car. It is the *car complete*. The line consists of four and eight-cylinder types, with five and seven-passenger open and sedan models, also roadsters and coupes.

THE SHERIDAN MOTOR CAR COMPANY

(Division of General Motors Corporation)

Muncie, Indiana

# A piston is only as good as its weakest point—

## There are no weak points in MARCO PISTONS

Marco pistons are the result of our observations and experience manufacturing and selling Marvel Cylinder Reboring Machines to automotive repair men in all sections of the United States—of rubbing elbows with the particular men who are making a life work of automotive repair work.

They are the result of a growing demand for pistons that will overcome piston troubles. Light in weight—substantial in construction—practical in design. There is nothing freakish or experimental about MARCO Pistons.

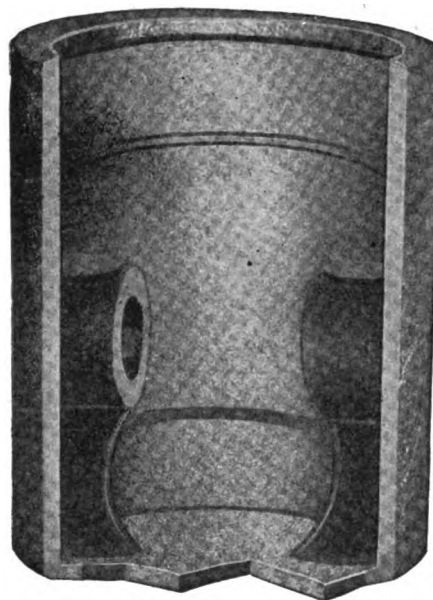
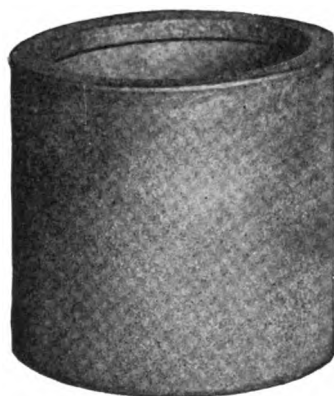
Marco Pistons are manufactured under our own supervision from selected grey iron of the highest quality. Every element entering into their construction—from pig iron to piston—is tested by our chemists and they are made in accordance with specifications of the Society of Automotive Engineers. Every

charge in the cupola is chemically analyzed. MARCO Pistons are as much alike as two peas in the pod.

The side walls are light but substantial—they are reinforced underneath the head and around the Boss. MARCO Pistons are as light as practical, as strong as required to give excess of power, range and flexibility.

## Marco on Pistons is as Sterling on Silver

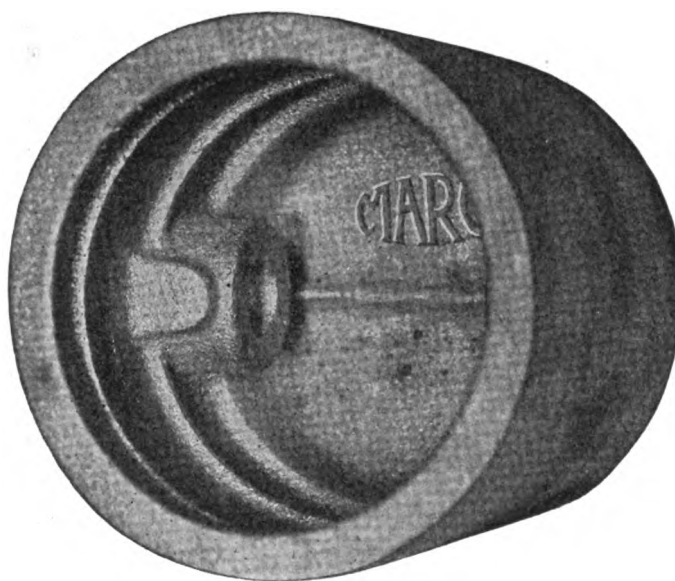
There may be other Pistons but there is only one MARCO—unapproached—unequalled. Do away with Piston troubles, use MARCO Pistons. Loss of compression, fouled spark plugs, piston slap, sticking, excessive pumping of oil are unknown with the MARCO.



## We Pride Ourselves on Marco Service

To keep pace with the increasing demand for MARCO Pistons we have recently installed new equipment and can promise MARCO users not only the highest in quality but the best in service. Castings on hand shipped the day order is received. Semi-finished and finished Pistons from two to four days. Patterns seldom called for a few days longer, but in every instance they are shipped at the very earliest moment. This unusual service is made possible by the fact that we have patterns for 2,500 makes and models of internal combustion engines—from motorcycles to trucks. MARCO Pistons are furnished in the rough, semi-finished or finished to the following standard oversizes, .020, .031, .046, .062.

Write for our latest pattern list which is indexed by sections, as Automobiles, Tractors, Stationary Engines, Marine Engines, Motorcycles, Gasoline Engines and Miscellaneous—the latter covering nearly two hundred patterns of pistons that have been made up at various times on which sufficient information has not been obtainable to permit of their classification. This section may prove a gold mine to you—perhaps it lists the exact pattern for piston that you now need.



The sign of a  
perfect piston

# MARVEL MACHINERY COMPANY

510 Loan & Trust Building  
Minneapolis, Minn.



The sign of a  
perfect piston



# "NORMA" PRECISION BALL BEARINGS (PATENTED)

Quality seeks quality. Which explains why "NORMA" Bearings are standard in all magnetos and lighting generators of the better class—and also why "NORMA" equipped magnetos and lighting generators are standard equipment on all cars, trucks, tractors and power boats built to a quality standard and sold on a quality basis.

See that your electrical apparatus is "NORMA" equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# American Garage & Auto Dealer

*Published Monthly*

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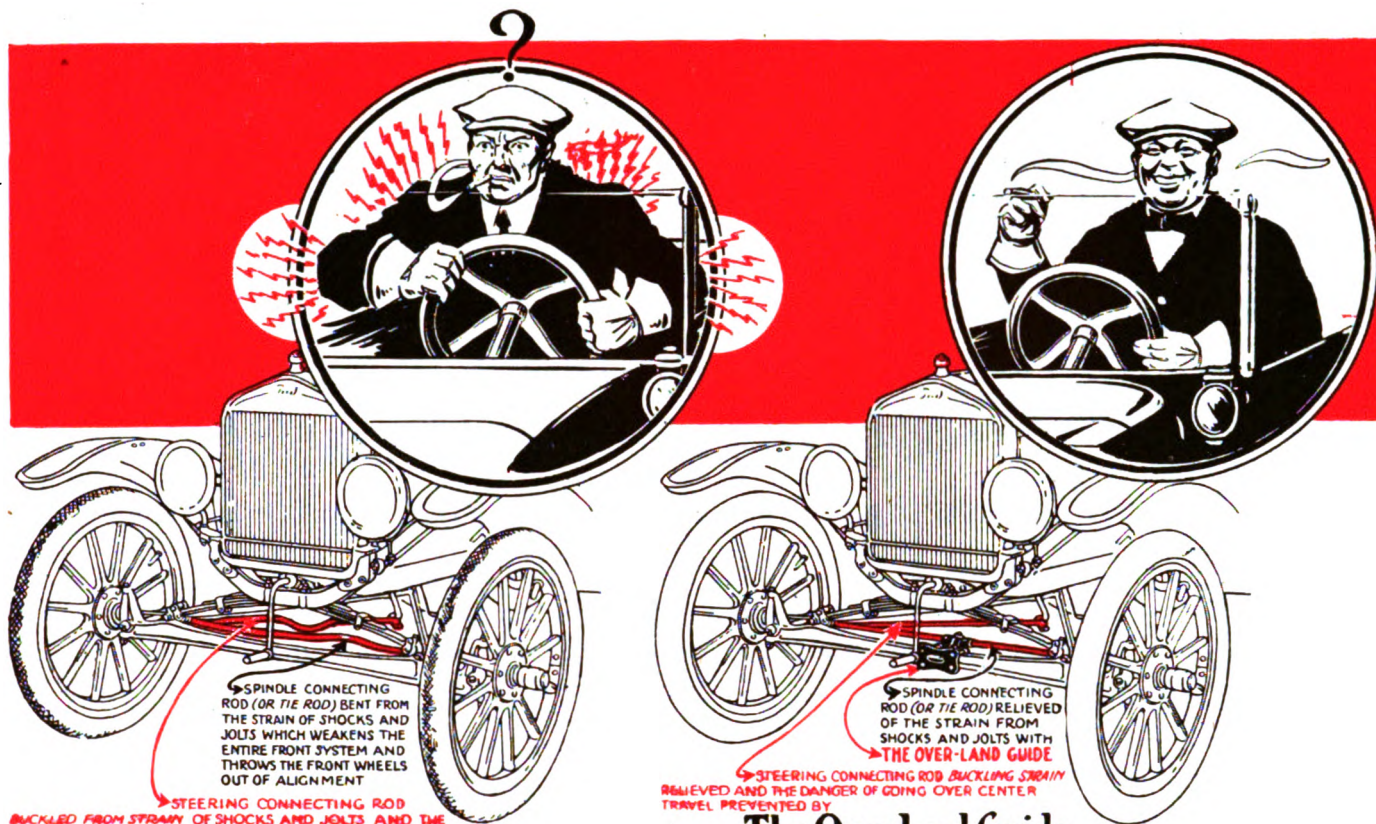
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## A Ford Controlling Itself

## The Over-land-Guide PATENTED Controlling the Ford

### This Wonderful Steering Shock Absorber

**SAVES LIFE AND MONEY. PREVENTS  
ACCIDENTS AND AVOIDS REPAIR BILLS**

After the Over-Land Guide is installed give it a severe test and try-out. Drive the car over the roughest roads you can find and when you strike a hole six or seven inches deep, remove your hands from the steering wheel, regardless of the speed you are driving. Then you will realize how the Over-Land Guide controls the running of the car, absorbs all shocks, and eliminates the strain and vibration from the front system and steering mechanism.

The Over-Land gives you the best insurance against danger of accident and destruction of your Ford car or truck through the loss of control caused by the steering connecting rod passing over center travel in short turns.

The OVER-LAND Guide will eliminate the danger of ditching and collision with the possibility of fatal results to the occupants and the destruction of the car even though the steering mechanism be broken or failed to work.

Your steering gears may get out of service, or the steering connecting rod may become locked over center travel, but the OVER-LAND Guide, with its grip on the rod and axle, will hold your car in the middle of the road until it is brought to a safe stop, avoiding the possibility of being ditched or destroyed.

The Over-Land Guide stops the wobbling, scooting, and creeping of the front wheels. It also removes the strain from the arms and shoulders of the driver. It is life-and-car-insurance of the highest order and affords a degree of security that makes it worth a hundred times the cost to any owner. It greatly reduces wear and tear on the front system and steering mechanism by eliminating vibration.

#### Pays for Itself Every Two Weeks in Reduced Wear and Tear

The Over-Land Guide is a STEERING SHOCK ABSORBER, takes up all lost motion, eliminates the shocks and vibration from all ball joints and bushings in the front system and steering mechanism, and in fact all ball joints and bushings that constitute a Ford car or truck.

The Over-Land Guide also reduces breakage and repairs of all the following parts—such as spindle connecting rod (or tie rod), spindle body arms and bushings, spindle body and bushings, Ball and roller bearings and hub, Steering connecting rod and ball joints, Steering gear drive pinion and steering gear pinions, Steering gear internal gear case and bushings. Also prevents the axle from bending—and may save your entire car from destruction with loss of life of occupants.

If you knew the advantages, comfort and protection to be gained by equipping your car with an Over-Land Guide, you would not drive another day without it.

**We will Ship you one Parcel Post for \$8.50**

**DEALERS**—The Over-Land Guide is a wonder seller. Write at once for our liberal trade offer

**THE MEIXELL COMPANY**

**216 Board of Trade Building, INDIANAPOLIS, IND.**

**Foreign Distributors**—Automobile Sundries Co., 79 Walker St., New York, N. Y.

This broad guarantee protects users of the Over-Land Guide. Send us retail price, **\$8.50** and we will send you, parcel post, one Over-Land Guide. Use it 20 days, properly installed, and if at the end of that time it does not do all we claim for it, full purchase price will be refunded.



In ordering state the year your car was made.

Unlike all other STEERING DEVICES, the SPRING in the Over-Land Guide is packed in hard grease and completely enclosed, which keeps it free from dust and moisture and means indefinite service and no up-keep.

**BRUNNER**

## A BRUNNER THROUGH and THROUGH

RESPECTED BY ENGINEERS AND MECHANICS

The No. 247 Brunner Outfit, is typical of Brunner equipment. In design it is simple. In construction it is rigid and heavy. It is not cluttered with freakish accessories. In operation it is economical and long-lived.

Full appreciation of this machine, comes only from using it—depending on it day in and day out. The conviction grows that the parts out of sight are all that the name "Brunner" implies.

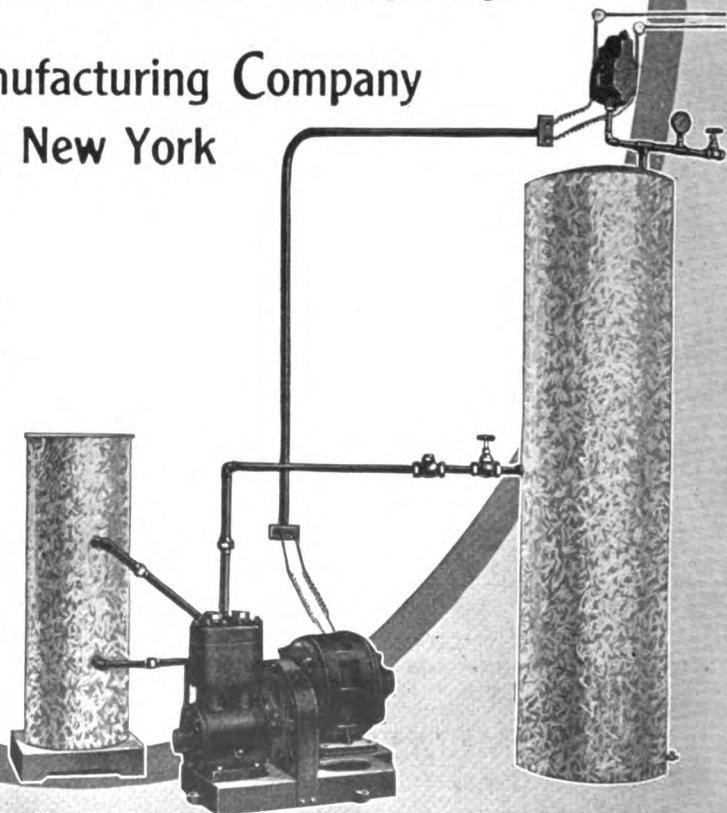
From valves to hose-line, each part is Brunner designed, Brunner built and Brunner assembled. A moderate price is possible only because of quantity production.

Smaller Brunner models, of identical quality, may be had at appropriate prices. Send for Brunner catalog and request any needed engineering advice.

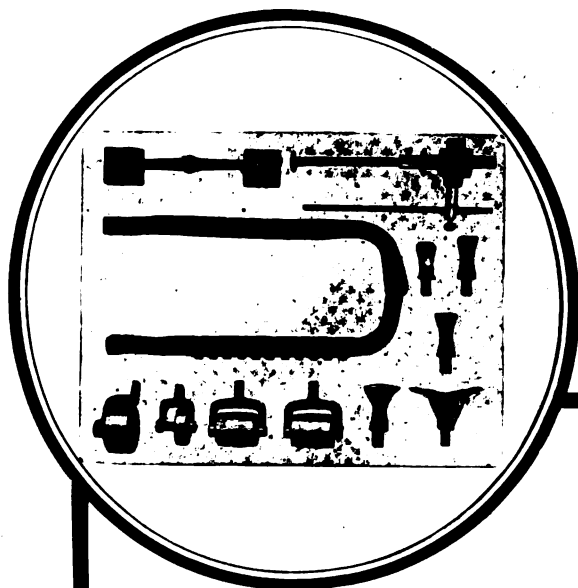
**Brunner Manufacturing Company**  
**Utica, New York**

Sales Offices

Utica, N. Y.  
Cincinnati, Ohio.  
Kansas City, Mo.







# Rolls Dollars *out of* Dents

*Stiles*

## **Rolls-em-Out Fender Straightener** *—marks a new era in automobile repair work*

**T**HIS unique tool offers a new source of profit for the Garage, Repair Shop and Service Station interested in the quick repairing of bent or damaged auto fenders.

With the Stiles Rolls-em-Out Fender Straightener you can straighten out any fender quickly—without removing fender from the car—and without marring the enamel or finish if not previously damaged. Does away entirely with the old laborious process of hand peening and bumping. Distributes the metal uniformly and reshapes and smooths the fender quickly and perfectly.

## **No Garage, Repair Shop or Service Station is Complete Without this Ready Profit Maker!**

Anybody can use this tool. No special mechanical ability or experience required. *Detailed and illustrated instructions with each set make any repair man an expert.*

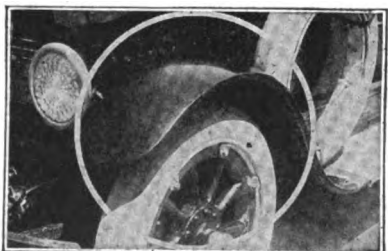
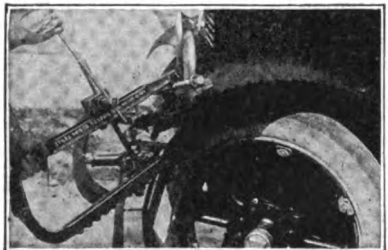
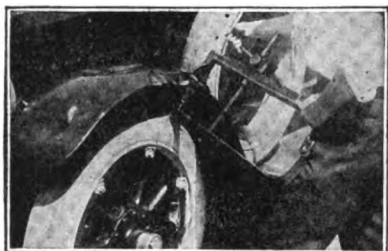
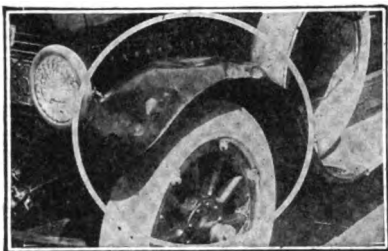
If your favorite Jobber doesn't stock *Stiles Rolls-em-Out Fender Straightener*, he can get one for you. Send to him or to us for descriptive literature.

**There is no doubt enough fender work in your shop at this time to more than pay for this tool**

**JOBBERS:** If you are not stocking this item, let us show you what you can do, and send you prices and literature.

MANUFACTURED ONLY BY

**STILES MANUFACTURING COMPANY**  
SAINT LOUIS U. S. A.





## The Cleanser of Many Uses

All you have to do to make a car owner a consistent user of SPEE-DEE is to introduce it to him—to show him what he can do with it. A simple demonstration will sell a can to any man who owns a car. And the best thing about SPEE-DEE, from your standpoint, is this—the man who once uses it simply can't be without it and will come back, again and again, for more.

SPEE-DEE appeals to every car owner because of its numerous uses. It cleans greasy, grimy hands, with or without water, an invaluable quality in cold weather or after making a roadside repair. It is equally effective in cleaning tops, seat covers, celluloid curtains, and running gear.

### Cleans Everything Injures Nothing

SPEE-DEE contains no lye, grit or acid to irritate the skin or injure the surface or fabric.

The price of SPEE-DEE is so moderate that all car owners can afford to use it freely. Yet the dealer profit is liberal.

Write today for complete information.

**STATES CHEMICAL COMPANY**  
680 W. Austin Ave. Chicago, Illinois





# American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,  
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol XI. No. 9

CHICAGO

September, 1920

## The Customer's Side

Business nowadays is simply another word for service. Regardless of the business a man is in, he renders a service—and the compensation he receives for that service depends entirely on how good a business man he is.

There are different ideas on service, and those business organizations which have been most successful and attained the highest standing, are those which perform the greatest service as judged by the standards set up by the purchaser or the consumer.

The names of Field and Wanamaker are known all over the country for the reason that the establishments which they founded operate entirely upon the principle of service rendered, judged not according to standards set up by the seller, but from the viewpoint of the buyer. Business men generally have been slow to learn this lesson, but they are fast becoming familiar with it.

Only recently telephone men in Wisconsin made a study of service. This study was not based upon what the companies considered good telephone service. It was made from the viewpoint of the subscriber and was based upon the service that he thought he ought to have and what he was entitled to.

The World War upset our entire national life and along with it was a marked deterioration in service rendered the public in all lines of

business. Now, however, conditions are changing. The public is not buying whatever is "dealt out" to it. The period of the "dealing-out" process is practically over. Salesmanship which involves service is replacing it.

In many localities there has been a noticeable "tightening up" and the automotive field has been affected as well as many other lines of industry. Just how far this contracting process will go is impossible to prophesy. The wise business man, however, is "putting his fences in order" and building for the future.

He is paying special attention to courtesy and service. He is seeing that a full dollar's worth of service is rendered for every dollar received—and then some.

If business does slacken up, as many anticipate, the garageman who has established a reputation for service will not suffer, for he will have an established list of customers for the many services he can render to and for them.

## The Garage Specialist.

We have specialists for the eye, ear and throat. Specialists in repairing certain make cars, so why not a specialist in caring for customers in the garage?

The writer is a car owner of many years and all the service he, as a rule, secures from a garage is a place to store his car, free air, and, at times, water from a leaky sprinkler. How

different it would be and what a reputation a garageman would make for himself if he would go out of the beaten path and give customers real service.

For example, would I not feel grateful to the garageman who would keep his floor so clean that, when I come into my home, I would not track oil, sand and grease into it? He can do it, too, by a little work which would repay him many dollars in good will.

The oiling system of my car has always been a sort of a mild puzzle to me. How grateful I would feel toward my garage man if he would say: "I see by my chart that you have not drained the oil from your crank case for three months. Let us do this for you tonight."

Would I say "yes," and be glad to pay a fee? Ask me and see?

Then, let him say: "Time to change your oil, its getting cold, and your grease cups should be cleaned out and winter grease put in. It won't cost you much and you will increase your car's efficiency."

If my garageman would keep a chart and tell me at the end of every certain period what should be done in the way of lubrication, battery water, spring greasing and other needed but dirty jobs, I would cry aloud with thanks, and pay well for the service.

Many times, when I am most in a hurry, I call at my garage and find my tires need air. This, as a rule, happens when I have a dress suit on or

am spick and span for some particular event. If my garageman, in making the rounds of his garage, would take the trouble to keep my tires inflated to normal pressure, I would bless him for the trouble.

As long as I have driven, I know there is always something new to be learned about a car in the way of care, attention and such other "kinks" that make driving such a fascinating pastime.

Why doesn't my garageman hold weekly meetings during the winter in his little office and let drivers such as myself and others "swap" ideas as we did in the horse-driving days around the stove in the stable office.

I am sure if a hint was given, many drivers would gather and form a sort of a "forum" which would result in considerable good and do the garageman no harm.

Lastly, most every part of my car is always clean but the floor carpet. A fellow does not want to have the car washed to secure clean carpet nor does he want to go to the trouble of cleaning it with a broom and getting himself dirty. If my garageman would blow out the dust with a nozzle from his air pump, I would say, "That's fine!" Wouldn't you?

### Figures Are Life-Savers.

Can you conceive of a more desperate situation than a man at sea in an open boat, without oars and with a great storm breaking over him? But did you ever stop to think that thousands of dealers are battling with business storms today that are just as perilous to their success as are the ocean storms to the man at sea in an open boat without his oars?

A possibility always exists that the man drifting helplessly at sea may be driven ashore, or that guards from the life-saving station may put out to his relief. But it usually is different with the dealer who battles with the storms of business life.

His only source of assistance exists within himself. He can expect but

little from without. Mighty few are the life-savers stationed along his course who are ready to put out to his aid when the winds blow strong and the waves roll high.

With success or failure depending entirely on himself, the dealer must know what he is doing every day in the year. No unsalable stock should adorn his shelves and every effort should be made to increase turnovers as rapidly as possible.

To succeed in this he should know always which lines are his best sellers. Furthermore, he must know how much his trade will demand of certain lines at different seasons of the year. Certain kinds of merchandise sell better in the fall than in the spring, and others sell better in the spring than in the fall.

With these facts at hand he is able to buy closely and judiciously, which also means rapid turnovers; and rapid turnovers mean new profits and a constantly swelling bank account.

To obtain the necessary facts to make this merchandising plan successful, the dealer must keep accurate figure records of every transaction. Guess work and haphazard methods never should be tolerated.

"But such records take too much time and are an added expense," many dealers say. "There are too few hours in the day as it is and expense already threatens to engulf us."

We know all that. But if figure records that may be obtained in half an hour each day, show a dealer which lines will retail ten times faster and make ten more profits than some other lines, surely such records are worth the time and the little additional expense that might be incurred. It would be far better to do away with some other duty and expense considerably less profitable, if the dealer finds it necessary to conserve time and keep down his overhead. Just try it once and see.

The time spent and the small cost necessary to obtain this figure information will be found the most profitable investment the dealer has

ever made. Ask any successful merchandiser and he will tell you the same. Furthermore, he will show that the lack of it is the cause of most of the business failures of today.

### Repairs and Roads.

Gathered around the lunch table they were discussing the automobile business. One of them, an excellent observer and practical business man, expressed his belief that garages which paid particular attention to motor truck repair work would find their business steadily increasing. Immediately, the others wanted to know his reasons.

"Roads," was the terse reply. "We have some good roads, but they are becoming poor roads right along. There is no systematic method for keeping them in repair. We build the roads and then do nothing further toward keeping them good."

"Go out on the roads in the country around your town and note the number of holes in them and how rapidly they increase during a few months. In these days, when motor trucks are being used so much for hauling purposes, particularly on the so-called short hauls, roads rapidly deteriorate."

"Of course, that's a good thing for the garagemen and the truck dealers. Trucks need more repairs and wear out more rapidly than if they were operated over well maintained roads. Dealers will have more opportunities to sell new trucks to replace them as time goes on."

"Until some systematic method is placed in operation to properly maintain the roads, motor truck repair work will be very brisk—and the trucks will continue to be replaced by new ones."

While temporarily the condition outlined may bring increased business to the automotive man, it is a condition working against the public good. Therefore, the automotive man should become a booster for good road maintenance, for he will profit most by it in the end.

Ten Years Ago Louis Roundy Entered the Automotive Game with \$15 Capital—Today He Has a Completely Equipped Establishment and a \$150,000 Business—His Is a Story of Aggressiveness—His Policy Spells System

A black and white photograph of the Dorr Brothers Motor Cars building, a long, single-story structure with many windows. A sign on the roof reads "DORR BROTHERS MOTOR CARS". The building is surrounded by trees and a fence, with a utility pole visible in the foreground.

He purchased his cars in Boston, which is about 92 miles from Keene,

[illegible]

**NO 4227 LOUIS E. ROUNDY**  
Woodburn and Linden Sts.,  
**KEENE, N. H.**  
**DUPLICATE**  
POSITIVELY NO PROPERTY  
DELIVERED WITHOUT  
THIS CHECK  
READ CONDITIONS ON BACK HEREOF

When asked what he considered the secret of his success, Roundy answered: "Looking after the interests of every customer and keeping on the job 14 hours a day for seven days a week." During the years in which he was getting his business established, he kept on the job 52 weeks a year.

One of the things that Roundy has found to be very effective in satisfy-

In his case, it is more than ever necessary to satisfy car owners because he is not located on a main street, neither is he in the center of the city. He is on a side street, and he cannot depend upon transients to

after season, and besides it is quite surprising the extent information about garages passes from one owner to another. Giving entire satisfaction  
(Concluded on page 16.)

**As Careful an Account Is Kept of Stock Parts in This Establishment as of Money Handled.**

On the other side of the tag is the order number, the name of the owner of the car, the license number of the car and the state in which it is licensed, the name of the car and the date. Below this come ruled lines having space for the different items charged

Every item of stock received is accounted for and not a single item leaves the stockroom without being charged. As careful a record and just as accurate a record is kept of the stock as of the money handled. A perpetual stock record or inventory is kept and every item of

## Employee's No. \_\_\_\_\_

[illegible]

**Every Minute of the Employee's Time Is Accounted for on the Time Card.**

up to the owner and the amounts charged. For convenience, the first seven lines have items printed. These are: Gals. gasoline, gals. oil, lbs. grease, storage, cleaning, tires, tubes.



# “Serious and Wilful Misconduct”

Sanderson Came Across the Expression “The Employer Shall Not Be Held Liable for Injuries Caused by Workman’s Own Serious and Wilful Misconduct”—The Judge Enlightened Him as to Just What the Expression Meant

By Chesla C. Sherlock

Sanderson’s many experiences with the workmen’s compensation law aroused within him a deep interest in the subject, particularly as to the measure of his liability in case of injury to any of the boys employed in his garage.

One day, he happened to be glancing through the printed copy of the law which the state authorities had sent him, and under the enumerated list of cases where the employer could not be held liable in case of injury, he found this expression: “The employer shall not be held liable for injuries caused by the workman’s own serious and wilful misconduct.”

“I wonder what that means,” mused Sanderson. “‘Serious and wilful misconduct’ is a broad term. It might include almost anything. Guess I had better drop in sometime and see the Judge about that.”

One afternoon, when the matter popped into mind again, Sanderson put on his hat and went across the street to the Judge’s office. There he stated the case. “I am an employer of labor in a hazardous occupation, Judge. I have had a number of brushes with this law already. Now tell me, what does ‘serious and wilful misconduct’ refer to?”

“The law does not define it. Am I right in assuming that every time a workman exceeds his authority or gets careless, he is guilty of ‘serious and wilful misconduct’?”

The Judge smiled slightly, passed over a cigar to Sanderson and settled back in his chair. “That’s the easiest question you have asked in a long time,” he replied. “I’ve got it at my finger-tips—won’t have to read up. So, here goes:

“The courts have never specifically defined just what the expression means. They have rather defined what it is *not*. Mere carelessness, for instance, or negligence, does not amount to ‘serious and wilful misconduct’ on the part of a workman.

“You will remember that compensation is payable to a workman where he is injured by accident ‘arising out of and in the course of his employment.’ He must be in the course of

his employment—his regular employment—and the accident causing the injury must arise out of that employment.

“Now, if a workman does anything which takes him outside the course of that employment, and he is injured, then he is not entitled to compensation. If he is employed to change tires up in the front of the shop and to do nothing else, but gets into an argument with a fellow back in the machine shop and tries to push that man’s hand into an emery wheel, but, in fact, shoves his own into it, then his misconduct has taken him outside the course of his employment and he cannot recover.

“The courts have said that if his misconduct is such as to virtually take him outside the usual course of his employment, then it amounts to ‘wilful misconduct’ within the meaning of the compensation acts. It is also obvious that where a workman has an intention to injure himself in order to recover compensation, he is not entitled to it, because he has not suffered a true accident, but merely a premeditated injury, which amounts to a ‘serious and a wilful misconduct’ within the law.

“To violate a safety rule formulated by the employer is, in California and most everywhere else, ‘serious and wilful misconduct,’ under this limitation laid down by the California court: ‘. . . convincing proof of the deliberate intentional violation of a rule formulated, brought to the attention of those whom it is intended to govern, and diligently enforced, will establish wilful misconduct.’

“In the case of the violation of rules, always remember this statement of the court. The employer must formulate those rules and post them in the shop. Not only that, but he must rigidly enforce them. He must not tolerate disobedience of them if it comes to his notice. Then, if a worker deliberately and intentionally violates one of these rules formulated for his own safety, he cannot hold the employer liable in case an accident occurs causing injury.

“In New Jersey, a workman was

expressly forbidden by his employer to use a certain ladder leading to an additional stockroom under the roof. He immediately used it, fell and was injured. The court denied him compensation on the ground that he had been guilty of ‘serious and wilful misconduct.’

“In West Virginia, a workman opened a blister on his hand. Infection set in and he brought suit for compensation. The court held that he could not recover on the ground that the injury was not received in the course of the employment, but was self-inflicted and, therefore, outside the scope of the act.

“In Wisconsin, the court has said that it is ‘serious and wilful misconduct’ for a workman in a shop to operate appliances which he has been expressly forbidden by the employer to operate.

“In California, a workman took his pocket knife and removed a splinter in his hand. The court refused to call this wilful misconduct, but said that it was an unwise act. Compensation was awarded, but in Connecticut a toolmaker removed metal splinters from his hand, which resulted in infection and dermatitis. It was held that he was guilty of wilful misconduct because there were express rules requiring an injured workman to report at a designated place for medical attention. A failure to do this, in the mind of the commissioner, amounted to wilful misconduct.

“Where the injury is the result of intoxication, compensation is usually barred. Intoxication, if not specifically made a bar to compensation by the law itself, is held to be ‘serious and wilful misconduct’ in itself. While liquor is out of the question any more, home brews and private brands are still available to many workmen and it is well to know this.

“You are not permitted, as an employer, Sanderson, to take advantage of the broad language used in the statute, but it is intended to give the employer protection where the workman has clearly taken liberties with the rights conferred upon him by this law.”

# Century Garage—One in a Hundred

The Up-to-Date Facilities in This San Francisco Garage, Its Equipment for the Comfort and Convenience of Owners and Customers Present Some Interesting Sidelights as to How the "Big Town" Man Does Business

By C. W. Geiger

The owners of the Century Garage at San Francisco set out on the principle that garage service could and should be improved. The result of this decision was not only the instal-

being connected to a 280-gallon tank under the sidewalk.

There are four gasoline buggies and three oil buggies each having five gallon containers for handling lubri-

and to prevent careless drivers from backing too far. In the foreground of the illustration showing these curbs can be seen the method of protecting the gasoline pumps by means of concrete abutments, *A*.

The arrows at *B* designate disks installed for the benefit of the floormen. When a stall is not rented regularly to a customer, a disk placed on the overhead wire near the stall number, indicates to the floorman that that particular stall can be used for transient storage. Thus possibility of mixups is eliminated.

In the same illustration at *C* is an electric call bell which operates in connection with the intercommunicating telephone system connecting the office with nine interior stations. There are three of these telephones on each floor, one being shown located on the pillar in the foreground. An electric light on an extension cord and the long hose for filling radiators are also attached to the same pillar.

At each telephone is a push button, by means of which the large bell shown at *C* can be sounded to call the attention of employees to the telephone when they are to be reached in this manner.

A concrete spiral stairway is provided for foot traffic to the second



The "Century" Building is Attractively Finished in Imitation Granite Concrete.

lation of a wonderful battery of pumps, oil and gas buggies and safety devices, but the arrangement of elaborate restrooms for ladies, smoking rooms for men, lockers for owners, and the maintenance of personal service of high degree for all patrons.

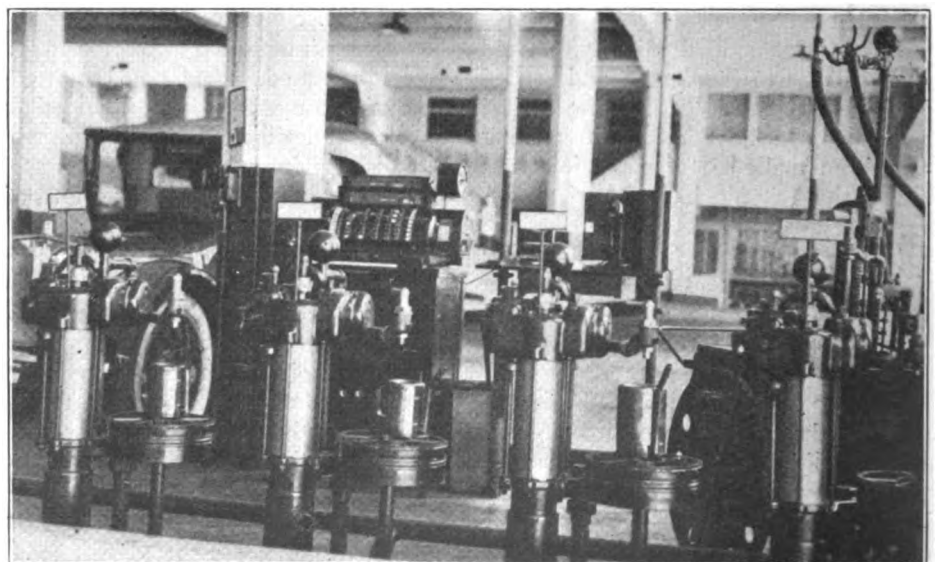
The equipment for handling gasoline and oils is most complete, systematically arranged, and designed to give rapid service. There are four oil tanks with a capacity of 280 gallons each. These are placed in the basement under the inclined runway leading from the first floor to the basement, so that no valuable room is lost.

One of the illustrations shows the battery of four pumps on the first floor, there being a similar battery on the second floor also. The drip-pans, supported on a pipe about 18 inches above the floor, eliminate the splashing of the oil on the floor.

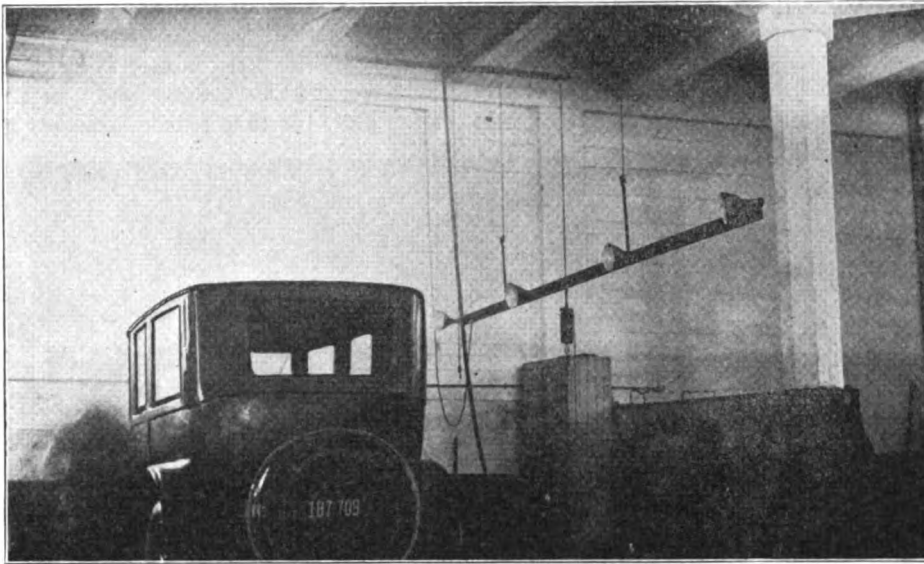
There is one pump on the first floor that supplies distillate from a 280-gallon can placed under the sidewalk. Three five-gallon gasoline pumps are on each floor near the exit, each pump

cating oil. There is also a pneumatic grease gun which is portable. Every pump is protected by concrete abutments, thus eliminating the possibility of an automobile being backed into it.

One of the safety features of particular note is the concrete curbs in the floor to prevent collision of cars.



A Battery of Four Oil Pumps is Located on the First and on the Second Floors.



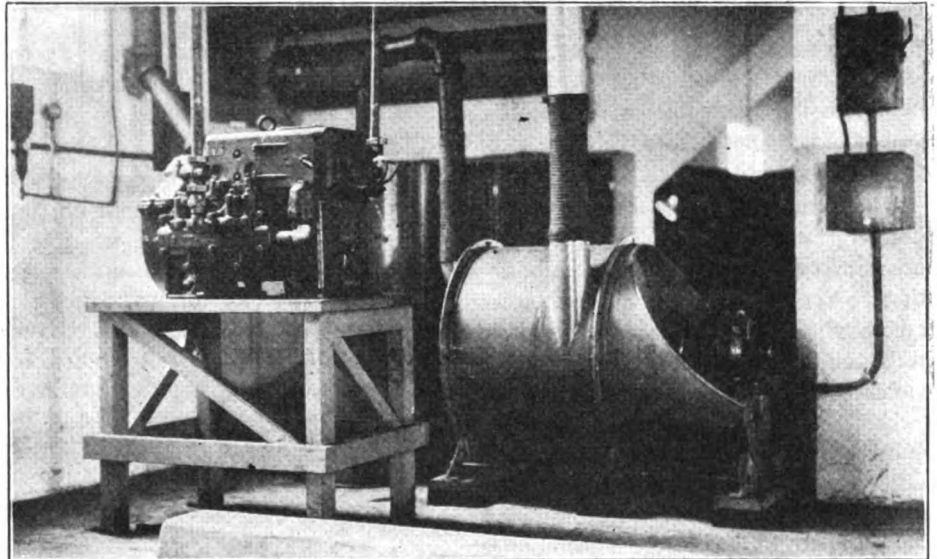
Four Electric Lights Shine on the Car When the Washing is Being Done at Night.

floor, and takes up less space than one automobile.

A large mirror has been so arranged at the top of the incline to the top floor as to give the drivers of cars coming in or going out a perfect view. The mirror is placed at the turn. Large plate glass windows at the exits of the building also give a plain view of the street.

A three-sweeper stationary vacuum cleaning machine has been installed for the rapid and thorough cleaning of the interior of automobiles and the floors of the building. A powerful air compressor delivers 140 pounds air pressure at any of the 30 outlets in the building for filling of tires.

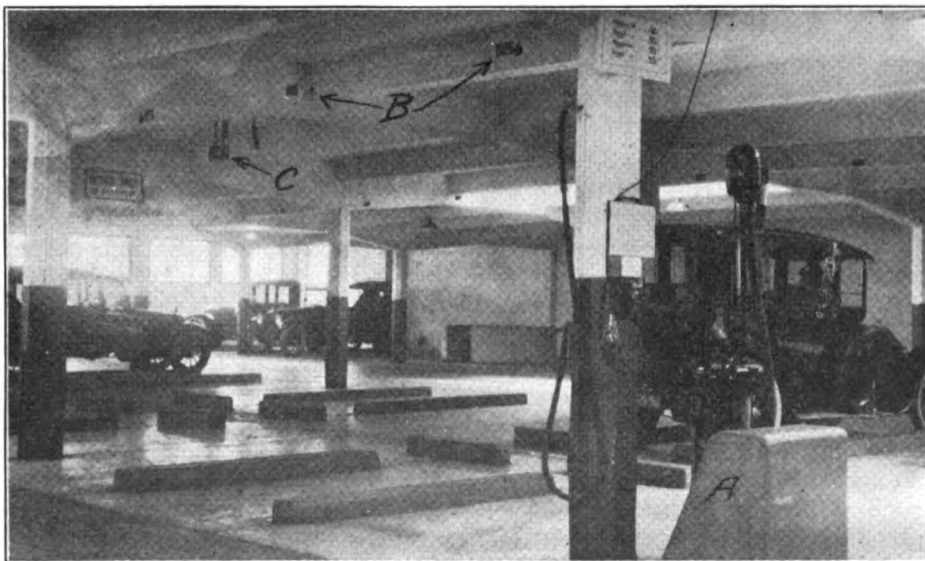
The vacuum and compressed air equipments are located in the basement. The vacuum cleaner is operated by a  $7\frac{1}{2}$  h. p. electric motor running at 1,740 r.p.m. The air com-



The Vacuum and Compressed Air Equipments Are Located in the Basement of the Building.

pressor is operated by a 9 h. p. electric motor, enclosed, running at a speed

are turned up as shown, thus causing the bench supports to rest solidly on the floor.



(A) Safety Curbs; (B) Disks Denoting Storage Space; (C) Electric Call Bells.

of 1,100 r.p.m. with automatic switch for cutting in and out.

For the purpose of lighting the automobiles which are washed at night, four electric lights are placed on each side of the washing rack. They are mounted on a wooden frame which is supported on ropes passing up over pulleys with a counterweight on the other end, by means of which the lights can be raised or lowered at will.

A novel, portable repair bench is shown in one of the illustrations. This is supported on rollers, which are attached to the bottom of the bench by hinges. The bench can thus be readily moved about on the floor to a car, instead of the necessity of bringing the car to the bench. When it is desired to work on the bench, the rollers

There is also an electric vulcanizer and a steam vulcanizer electrically heated. The floor of the garage is scrubbed with an electrically-operated floor scrubbing machine, the extension cord of which may be plugged in at any of the various electric sockets. This has been found to be much more satisfactory than scrubbing by hand.

There is a combined office and accessory room. New tires are stored in a dark room which keeps the rubber from deteriorating.

The structure has a frontage of 124 feet and a depth of  $137\frac{1}{2}$  feet with the main floor on a level with Post street. The sub-story, with a ceiling height of 14 feet, is below the level of Post street, but more than half its height is above the adjoining street,

so that it gets daylight and ventilation.

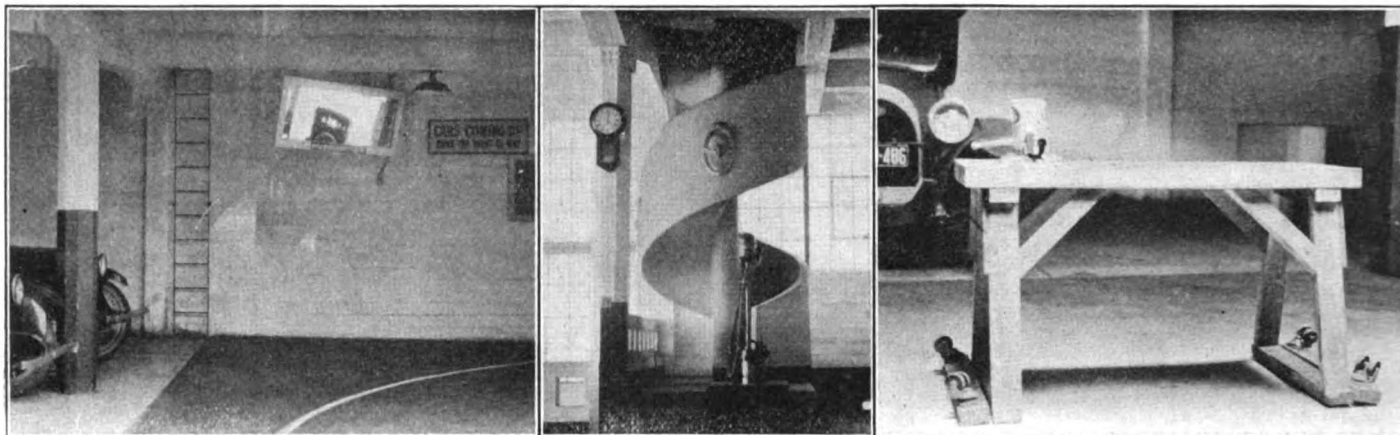
The second story, with a ceiling height of 12 feet, is lighted from the front and is covered with large ven-

### Difficulties Meant Nothing.

(Concluded from page 12.)

becomes more and more important as the number of tourists increase, if any transient business is to be secured, and

the premises who is just as skilled in his line as the foreman or other employees are in their lines. He strives to have the best repair shop in the state and, for that reason, believes he



Glimpses of the "Safety Mirror," the Concrete Spiral Stairway for Foot Traffic to the Second Floor, and the Portable Repair Bench.

tilating and fireproof skylights. The second floor and the sub-story are made easily accessible with inclined runways 17 feet wide which permit traffic going both ways.

The garage, which is finished in imitation granite concrete, is constructed of reinforced concrete from foundation to roof and with metal windows and skylights glazed with wire glass, thus being as near fireproof as is possible.

Each of the two entrances are wide enough for three cars to pass each other, and the wide aisles permit easy handling of the largest automobiles and trucks.

The building will accommodate 225 cars.

Each car is safeguarded from collision with its neighbor by specially designed concrete division curbs and bumpers, which provide a safe storage space.

The westerly front part of the main story is divided into two stories, the lower portion containing the office, accessory room, storeroom, telephone booth and steam-heated lounging room for chauffeurs, with toilet accommodations and lockers for employees.

The upper portion, or mezzanine floor, is arranged exclusively for the convenience and comfort of patrons and friends, with a very attractive restroom for the ladies. The floors are tiled, the walls are liberally covered with mirrors, and the rooms are steam heated.

it naturally is necessary to satisfy the local car owners if their business is to be secured.

The men in the shop are paid by the hour but, instead of using a time clock, the record of the time is kept on time cards where every minute of time is accounted for and charged up to some job. This is one of the ways in which the pennies are accounted for. Every day the foreman fills out a card for each man which gives the employee's number, his name, the numbers of the jobs on which he worked, the time he started on each job and the time he finished, as well as the total time spent on each job. This report is signed by the foreman.

At the bottom of the card is space for recording the total number of hours for the day, the rate, and the total earned by the workman for the day. There is also a space left to fill out to show that the data has been entered on the payroll and another to show that it has been entered on the repair orders. By means of this card it is possible to watch the time of the employees as closely as the stock and the money is watched.

All these forms, however, would not, of course, amount to very much if there was not someone on the job all the time to see that they are used correctly and that they fit into the whole system. This is where the services of the expert bookkeeper come in. Mr. Roundy realizes that no matter how good a shop and how good a foreman he has, he can't expect to conduct his business satisfactorily if there isn't a record keeper on

should have the best bookkeeper in his office in the state.

Mr. Roundy, as may have been guessed, is a finished salesman. A person can hardly call upon him without wanting to buy something from him. He has the ability to inspire both confidence and desire to buy. It was this that made it possible to build up his business. But there are a great many finished salesmen in this world. Mr. Roundy is something more than a mere salesman. If he was not, he would not be in business today.

He realizes the necessity of a well-rounded business, of a proper balance in order to permit a business to grow beyond a certain very limited minimum. He realizes the necessity of seeking expert services in those lines in which he does not excel, or in which he cannot make his own efforts count to the greatest extent. Therefore, he seeks this expert service rather than neglect any phase of his business.

With a repair department in charge of a man who is as expert a repairman as he, himself, is a salesman, and with the bookkeeping in charge of a person who is as great an expert in bookkeeping, it is easy to see why he has been able to increase his business from nothing to \$150,000 in less than ten years and that he is still going strong and will continue to grow in the years to come. He is backing up his own sales ability with an organization that means satisfactory service to customers and creditors and a satisfactory bank balance in the bank at the end of the year.



# Catering to the Trade of the Farmer

Dealers, Don't Let the Mail Order Houses Get Ahead of You—You Can Get that Farm Trade You Are Missing by Impressing the Farmer with the Fact that He Needs Accessories and that You Have Them for Him—Advertise!

By Fred Counterman

Not every garage manager or accessory dealer realizes the value of the farmer's trade in his line. In the smallest towns and villages where the business is 90 per cent with the farmers, that phase of the business is appreciated better than in the larger towns and cities where the big business seems to be that which comes from the moneyed classes.

In these days, we are fond of saying that every farmer now has his car, either a passenger car or a truck. The real truth is that so large a percentage of farmers do have cars that their automobile supplies' business is important.

Two things are keeping the local dealer from getting as much as he ought to get of the farming trade in accessories and supplies. For one thing, the mail-order houses are sending catalogs of automobile goods to the farmers with the same regularity with which they send their other catalogs. And then, the farmer does not use as many accessories as the city owner, mainly because he does not

and yet what a large proportion of farmers' cars you see with crumpled fenders and other conditions that show where a bumper would have saved the car. The farmer may not

sories, but how can he be sold? The mail-order houses are selling him more or less such goods because they send him their catalogs. They ask him to buy, and all the local dealer needs to

## Bang! There Goes a Spring!

It wasn't much of a hole in the road. You've gone over lots worse ones without having a break. Perhaps some of those worse ones started the break.

Anyway you never know when you are going to break a spring and if it happens far from home, which it may, you very likely have to leave the car. You surely have troubles of your own.

Why not get rid of this fear of broken springs and at the same time ride with infinitely more comfort by putting on shock absorbers?

Shock absorbers make any car 50 per cent better riding. They save the springs. They save vibration of the sort that is constantly disarranging adjustments and reducing the efficiency of the engine. They save tires and gasoline and oil and everything else, including temper.

Perhaps you need shock absorbers only rear or only in front. Perhaps you need the whole set. Let us talk with you about it and suggest what you should use, and tell you the cost. No harm in asking us, is there?

Johnson's Central Garage.

An Advertisement Which Gives a Good Idea of the Advantages of Owning Shock Absorbers.

## Make Your Car Last.

An automobile costs so much money now that if there is anything you can do to make it last longer, it is mighty good economy to do it.

Don't take chances of spoiling the appearance of your car—perhaps damaging it seriously—just for lack of a bumper to protect it from being struck front or rear.

Every day you see cars that have been damaged by front or rear collisions or bumps that were not serious enough to be real accidents but still damaged the car more than the cost of several bumpers.

Put on a reliable bumper and save your fenders, lamps, perhaps even the gas tank or other parts. A good bumper for a Ford costs you \$12.50 put on the car. Others at \$11.25 to \$14.50.

Then there are other things that save your car, making accidents less and reducing actual wear. Shock absorbers, Everright piston rings, snubbers, chains, etc.

Is your car equipped with all the things it needs for its protection? Play it safe. Spend a few dollars for extra accessories and make the life of your car longer. Keep it looking better. Increase its sales or trade-in value.

Right now see our big window display of accessories that make the car last longer.

Johnson's Central Garage.

Don't Wait for the Farmer to Find Out That He Needs a Bumper—Tell Him He Does.

know or think about them, or regard them as necessary.

The farmer does not put a bumper on his car because it has never occurred to him that he needed one,

wagons to a greater extent than he would if he were driving in traffic much and accustomed to it.

But the question is not whether the farmer needs and can be sold acces-

do to get such business is to ask for it and keep asking.

Tell the farmer about such accessories as he can use and urge him to buy. Don't sit back and wait for him to come in and ask if you have bumpers, or shock absorbers, or piston rings, but go at him with your advertising and acquaint him with the advantages of the things you think he should buy.

You might use such advertisements in newspapers as those shown on this page.

Of course, one advertisement will not convince all the farmers around you that they must have such accessories as you mention. You have to keep right on with the ads. Devote newspaper space to the matter in every issue of the paper. Specialize on one thing at a time, if you can use frequent ads. Don't try to convince a man in one advertisement that he needs all the things in your shop. For instance, talk to him about shock absorbers.

These advertisements are not written exclusively for their appeal to the farmer. Perhaps you would rather use a form letter more particularly adjusted to interest rural classes.

Dear Sir:

You come to town in all kinds of weather. You have to drive in the rain and sometimes in the snow storms. You have found that it is impossible to drive rapidly or safely with your windshield a blur of rain or snow.

Why not invest a dollar in one of our Windshield Clearers and make driving in the storm as easy as in clear weather? Your windshield cleared with one motion.

And, speaking about coming to town in the storm, how about tire chains? Have you grown a little careless about that protection? Are your chains a carryover from your last car and a poor fit for the present tires? Or were they fitted to new non-skid tires and are accordingly too long for the present well-worn treads?

The next time you come in, let us inspect your chains and put in new cross links if they are needed. Perhaps you need a new pair of chains for actual safety. Anyway, take no chances with chains. Using old, worn chains may mean a break or an unfastened hook and a chain winding up on the rear axle, putting you in the ditch.

And speaking of safety, you ought to have a spotlight for the crooked road and for use when making tire changes or other repairs on the road. You can't work in

advertisement as well as the mail order house does it and without cost.

Get a cut of the hand pump you want to advertise and run it with an advertisement similar to the one on this page.

The farmer is usually a man who is accustomed to the use of tools and to doing many things for himself in the way of minor mechanical operations. He should afford a particularly good market for vulcanizers of the sort adapted to amateur use in making the less important repairs. Here is a letter calculated to develop interest in such devices:

Dear Sir:

What makes tires go to pieces with blowouts?

Usually cuts and punctures which develop weak places in the fabric because they let the water in to rot the carcass of the tire.

When a tire is so badly worn that it blows a hole, you are expecting it. You

Try your farmer trade with a piston ring letter along these lines:

Dear Sir:

Your car would get increased power from the use of Reeltite Piston Rings.

A Reeltite ring does not, cannot leak. No power escapes it. You know the advantage of a perfectly tight piston ring. It gives your engine more power. It saves gasoline. It gives you more mileage out of gas and oil, and it gives your car more pep and more speed.

One Reeltite on each piston will do the trick. A couple would be better. The rings cost \$1.25 each.

We can give you the names of car owners you know who have put on Reeltite rings, and you ask them. They will tell you how they helped their engines.

Yours very truly,

J. J. JOHNSON.

So large a proportion of farmers use Ford cars that it will pay to have a mailing list of Ford owners in your territory and send to them occasional letters about accessories for those cars. Get supplies of advertising matter, too, from manufacturers and send that matter to this list.

The farmer, owning a car, will be a willing reader of advertising matter about accessories for that car. He will be interested at all times in such helps as he can get for its efficient operation. He is a good reader of advertising that is adapted to him.

During the season, if you can send out a weekly circular or advertisement of some kind to your list of farmer motorists, you can get the lion's share of the trade from them. They are going to give their business to the man who asks for it. If you are that man, you will profit by your efforts.

You certainly cannot expect to get your share of the farmers' trade by merely sitting back and waiting for it, perhaps kicking occasionally about the encroaching of the catalog houses or the mail order accessory house. Get busy! The farmers' trade responds to advertising for it better than any other class of business. If the business is not worth going after, it is scarcely worth having.

#### Truck Service Between Los Angeles and San Francisco Proposed.

A motor truck freight service between San Francisco and Los Angeles is proposed in a recent application filed with the California Railroad Commission by the United Motor Freight & Express Line. Existing truck lines, it is said, cannot accommodate all of the available business.

#### Was It Tire Trouble?

Didn't we see you sweating away at a tire pump by the road last Tuesday? Hot, wasn't it? What a lot of air a tire does hold!

Listen! Here is the Lightning Pump. It is an easy-working, quick-action pump that fills a tire with less strokes than any other we ever saw. It makes it easy to put enough air into a big or a little tire.

Don't wear yourself and your friends out with one of those old single-stroke, slow-action affairs, such as come with most tool kits.

Get a Lightning and cease worrying over tire inflation. You won't care whether the garages furnish "Free air" or not if you have a Lightning. The hard end of tire changing is made easy.

Price \$3.50, and if your time and labor are work day wages, you will pay for the pump the first month you have it, without saying anything about the satisfaction you will get out of it.

Johnson's Central Garage.

#### Vivid Description of Discomforts of Tire Pumping and Machine to Eliminate Them.

the dark. A Nodark Spotlight can be used as a trouble lamp anywhere on the car, throws a strong light ahead, and has a mirrorscope back. Only \$8.50 on the car.

Everything for safety in driving. Come and see us.

Yours cordially,

J. J. JOHNSON.

The mail order catalog gives quite a detailed description of each item and the farmer is enabled to learn from it just what the article is intended to do, what it costs, and usually, from a cut, what it looks like. Your advertisements, to compete with the catalogs, must do something more than tell the farmer that you have certain things for sale, leaving it as if he must just naturally know all about what the goods are like.

You will usually be able to secure from the manufacturer a cut of the thing you want to illustrate. In that way you will be able to illustrate your

know you have it coming and you have no one to blame if you see fit to sacrifice a tube that way.

But if you neglect to fill the smaller cuts and holes in the tread, that is carelessness and the tire and tube go when they should have worn hundreds and probably thousands of miles longer.

Get a Handy Vulcanizer and fix up every hole in the tread of each casing. Keep out the water. Then the tire wears out instead of blowing out too soon.

Use the vulcanizer to patch your own tubes and save the shop charge. Practically the only expense in doing this vulcanizing for yourself is the first cost of about \$1.50, and it lasts almost forever.

Vulcanizing a cut or a punctured tube is the work of a few minutes. You can do it on the road. With a Handy Vulcanizer you are sure to cut your annual tire cost at least 25 per cent. You will have tire trouble only when the very rare big cuts come.

We have everything in the way of tire repairs and patches and cement. Whatever your tires need can be bought from us as cheaply as anywhere.

Yours very truly,

J. J. JOHNSON.

# "There's Lots of Leeks in a Garaje"

Lost Times One of the Leeks in a Garaje and There's Sum Fokes Waists  
Stuf Becaws They Dont Taik Care of Odds and Ends and Big Things Too—  
Sumtimes I Wunder How the Boss Maiks a Living with Everybody Waistin

By Frank Farrington

Deer Pete:

Gee, our exqwisit casheer, Dazie, is getting so she reminds me of what shaikspeer sed. It's like this, "A diller a doller a 10 o'clock skoller what maiks you cum so soon? You used to cum at 9 o'clock and now you cum when you get darned good and reddy."

When the boss was away on his vacashun she used to get around so lait that we had to trust sum fokes we coodent maik change for and we havvent got our pay yet. And when the boss got back she diddent do much better becaws she just figgers on getting down before he doez.

The other day he surprized her by being there first and she said, "My goodniss Ime lait." And the boss sed, "So it is. Did your taxie brake down?" And she just smiled him one of those ate doller smiles Ive cawt her giving him before and that was all there was to it.

But say, I got in a littel lait myself today and the boss was there and I sed, "My goodniss Ime lait!" and the boss diddent ask me ennything about my taxie. He sad, "Youre darn rite you are and youve got to qwit this cumming in heer just in time to see if the clock is with the noon whissel."

Gee, he had an awful grouch. It was the first time Ive bin lait in a munth and it wassent so very lait at that. He hassent bin down that erly in a yeer and when the boss never gets around on time he cant expect his men will all be there when the bell rings. No, sir! Theres Persy, he never gets in til the last minnit before the boss cums in. I wish heed get cawt slipping in lait.

But I diddent say ennything to the boss. When I get balled out if Ime rong I dont try to maik enny speeches.

Ennyway I remember what Bob told me a long time ago. He sed it lookt to him as if I was getting in the habbit of cumming in lait, and I gess I was at that.

He sad, "You get payed for working ful time, dont you? What wood you say if every weke the boss wood hold back 50 cents of your munny and not say a word about it? Youre holding back every weke part of what you oe him, so wheres the differense?"



When I Wuz Lait the Boss Didn't Aske Me Did My Taxie Brake Down.

I never lookt at it like that before and sinse that time if Ime lait its becaws I cant help it, like it was to-day.

I dont want to cheet ennyboddy and if I oe a man so much time every day, Ime going to pay him. Ime that way. But I think at that the boss mite be a littel good natured with a feller til he finds out what made him lait and how offen heze lait. Heed ought to investigait a littel and if he did that Persyd get the run. Ide be in favor of maiking it unannymus with Persy and I gess theres others.

Bob sayz lost times one of the leeks in a garaje and he sayz theres so darnd menny littel leeks that its a wunder the ship dont sink. I dont kno ennything about ships, but I kno theres sum garaje leeks all rite.

Now theres Chick. Chick's a good feller and heze onnist as 16 to the pound and mebbly 17 but he waists a lot of stuf just becaws he dont taik

care of the odds and ends. Heel use a big gob of waist for one wipe and thro it on the dump pile becaws its in his way, and heze alwys loozing tools and things and leeving em in fokes cars.

Say if he was a dockter and cut out your appendicks heed probably leev his jack nife in your stummick, and if he was a dentist heed send you off with the forsips sticking out of your mouth. Thats the kind Chick is and

you needent tel me it dont cost munny to hav him working around.

And Spike, he gets crazie displaying tires leaves em in the sun and then along cums sum feller that wont buy em becus theyve bin unrappt in the lite and air too long and I dont blaim him.

Bobs about the only one that dont waist ennything, but

Bob says he mite be more careful than he is and he balls me out every few days for waisting gas or oil or sumthing. Wel, you kno how it is about filling ennything. You sumtimes fil it too ful and there goze whats run over.

So I wunder a good menny times how in sam hil the bos manages to maik a livving when everybody waists proffits the way we do but I dont kno as I nede to fele so terribly bad about it at that becaws the boss has just gave his wife a new seed ann.

Ime glad if the boss is maiking munny. I woodent want to work for a guy that diddent maik enny munny and he probably woodent kepe me very long eether or ennyboddy else. There aint enny class to a garaje that doessent maik enny munny and a feller has sum pride about what kind of a joint he works in. Ime that way, aint you, Pete?

I gess bosses aint the only ones thats fussie about who works for em. I

gess men and boys and Dazie too can be fussie about what kind of a boss they work for. Buleve me, I dont want to work for a guy that dont kno how to run his bizness. Everybuddy thinks youre a cheep skait if you work for that kind of a feller.

Ime only a generul youtillity feller, but Ime a good one and Ime going to

work where they nede a good one.

Say, theres garajes in this town I wooddent wash ford cars for, let alone be one of their main workmen. My boss aint the angil gabrel or ennything like that and I get prettie hot at him sumtimes, but cum to think about it, he knoze how to run this outfit so theres sum clas to it and it

maiks munny. Leeks or no leeks, lait in the morning or not, I shood worry. Pete, if he maiks it pay and Ime going to stay with him til Ime fired.

Cum over on your bisikkel sum sundie, Pete. Ile blo you to a good dinner at the Ralerode luncherie.

Yours,  
BILL

# Godshalk's Garage Gets the Business

In a Cream Brick and Stone Two-story Garage Down in Pennsylvania J. M. Godshalk Successfully Bucks His Four or Five Competitors—He Uses Efficiency Methods and His Motto Is "What Man Has Done Another Can Do"

By K. H. Lansing

Lansdale, Pa., is a small town in every sense of the word, and yet—

Jonas M. Godshalk, in his cream brick and stone two-story garage, service station and salesrooms, at Main and Line streets, sells:

Overland and Ford passenger cars,  
Happy Farmer tractors,  
Bethlehem motor trucks,  
Tires and accessories.

He successfully bucks his competitors—some four or five—in his town and withstands the sharp rivalry of garages and automotive equipment dealers in the larger nearby center of Norristown. He gets a large tourist trade, his location being especially strategic—at important thoroughfare intersections.

His place of business is handsomer and better equipped than that of any motor-car dealer in either town—and they all have to admit it. In fact, there are no garages in Harrisburg, the capital, better looking and but few its size in Philadelphia which are more completely outfitted and prepared to do the various lines of business Godshalk engages in.

System has done it. "What man has done another can do," says the old saw. Here's how Godshalk is doing it in his town of less than 4,000 population:

He has his business sharply departmentized, well-defined and orderly. He has neatly arranged and system-

atized stockrooms for tires and accessories, with all bins numbered and labeled—"a place for everything and everything in its place." Many a big city house lacks the method found here.

Godshalk makes it a rule to have his salesman see every prospect on his list—and it's some list—every ten days, continuing this plan until the prospect makes it very certain that he does not intend to buy.

He sees to it that factory and distributor keep him well supplied with the usual type of folders and "follow-

for instance, repairs, passenger car, tractor or truck. Checking is made in this way for advance dates and with ordinary black lead pencil for past dates, like "calls made," or "car repaired."

Spaces are provided on each card for entry of the following data:

Name of firm or individual prospect; street address, residence address, telephone number, city and state; business, rating, party to see on calls; subdivisions under this heading for calls and letters, in parallel columns; orders, with sub-caption for amount, and a special place at the bottom for remarks to aid the salesman, or to call to mind the prospect or customer's peculiarities.

The same general ideas are carried out for each line of business, only more data is collected in the case of farmers who contemplate purchasing tractors. Data about their farms and the style of machine best

adapted to the work of each are carefully preserved on file.

Godshalk has built up a reputation throughout the country for courteous service and a service that is on the square.

Satisfied customers he considers as his best advertisement and he is prompt to make amends if a mistake is made. His attitude is "always give the customer the benefit of the doubt."



Few Garages in the Keystone State Are as Completely Outfitted as Godshalk's.

up" literature and not infrequently dopes out his own "follow-up" letters.

This is the way Godshalk keeps track of his prospects:

He keeps an index file of prospect cards, 5 by 3 inches. At the top of the card are numbers for the days of the month, from 1 to 31, extending across the top of the form. These dates are in pencil of various colors, or colored ink, to denote anything he may wish to see the prospect about—



# Repairing Automobile Tires for Profit

Repairing Cuts in Fabric and Tread With Small and Large Vulcanizers—  
Wrapped Tread Method of Repairing Casings Which Is Simple and Offers  
Economical Advantages to Repairmen Entering Business—Third Installment

By M. E. Faber

Anyone with the slightest mechanical ability without previous practical experience in tire repairing, if provided with simple equipment, can easily mend blow-outs and cuts in the fabric and tread. It's not at all difficult to repair tires if proper equipment is used and instructions carefully followed out.

The use of the word "blowout" in tire repairing refers to that class of tire injuries in which the fabric has been torn clear through, directly on the tread or close to the rim. It may be large or small, but the principle to be followed in making repairs is always the same, namely, to re-inforce the canvas or cord fabric to its original strength and then to weld the hole in the tread full of tough new rubber.

As an example, let us take the blowout shown in Fig. 1, and follow the various

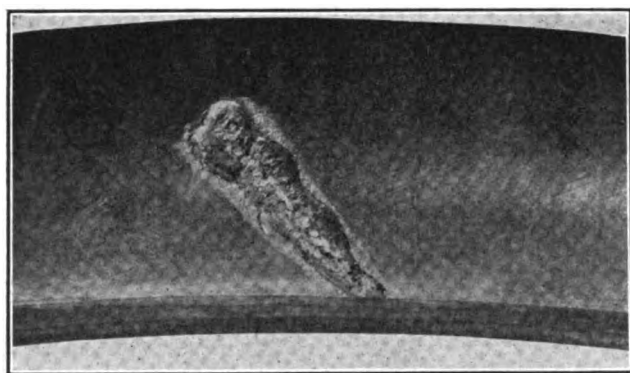


Fig. 1. Blowout With the Fabric Torn Clear Through Between the Tread and the Bead.

steps in the preparation and curing of a repair that will probably outlast the tire.

The first thing to do is to clean the hole through the tire and for at least six inches all around it on the inside of the casing.

This is easily done by keeping the tire moist with gasoline and scraping it as illustrated. When all of the old rubber has been thoroughly cleaned off the canvas on the inside, give it a final washing with gasoline and set the tire away to dry until the gasoline has all evaporated.

Next coat the injury with vulcanizing cement which should be smeared in between any loose plies of fabric at the ragged edges of the damaged part. The entire cleaned surface on the inside is also cemented. Two or three layers of cement are applied, allowing each to dry thoroughly before applying the next.

Take a piece of repair canvas which is coated on both sides with raw rubber, and cut a piece about two inches larger

in each direction than would be required to actually cover the hole.

This is placed on the inside of the tire over the hole and carefully rolled down as in Fig. 4. Another layer of canvas an inch larger than the first is then applied and rolled into place as is shown in Fig. 5.

For a 3-inch or 3½-inch tire, four layers are sufficient, each being about an inch larger all around than the one that precedes it. For larger tires it is better to use five layers of new canvas in order to make the repair as strong as the rest of the tire. The last layer in all cases may be of fabric coated on one side with rubber. No cement is necessary between layers.

Nothing has been cut away from the fabric originally in the tire except possibly ragged, rotten parts that cannot be worked back into the repair. To all intents and purposes a blowout patch has been built upon the inside of the tire and all that remains is to fill the

gash on the outside.

Practically this is the same as repairing just a superficial tread cut, because the fabric that has been put inside of the tire gives all the strength required and all that is necessary to finish the job is the waterproofing plug to fill the hole through the rubber on the tread.

The preparation of the outside of the tire simply requires filling the cut with scraps of raw rubber, as in Fig. 7, which do not have to be cut to fit the hole because the raw rubber melts and flows into every crevice when heated.

Unless the vulcanizer is being used continuously and is already heated, the

(Copyright by M. E. Faber.)

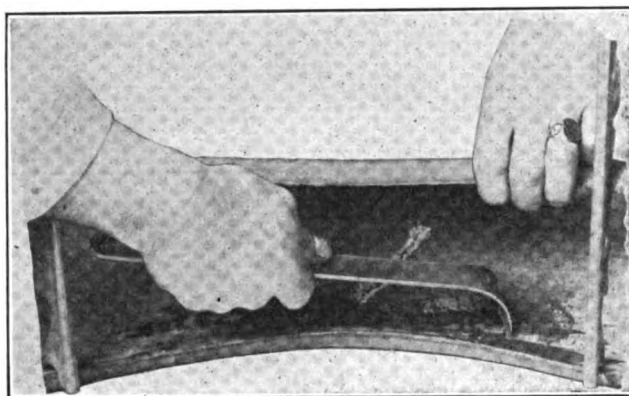


Fig. 2. Thoroughly Clean and Scrape the Inside of the Casing and Clean It on the Outside, Too.

workman should have had it heating for the last half hour, so that by the time the last step of repairing the tire is finished, the vulcanizer will be ready to go to work. If the vulcanizer has its temperature regulated automatically, it will not need to be watched while heating or while vulcanizing, so that one can go right on getting repairs ready while steam is being raised and while other tires are being vulcanized.

The prepared tire is placed on the inside form, which, owing to its peculiar shape will take any sized tire. A binding of heavy linen tape is then wrapped around the tire as shown in Fig. 8. Then, by tightening the tension screws in the sliding bar underneath the heater, an enormous pressure is produced that forces the repair and the tire very tightly together while they are being heated.

To insure a firm pressure on the sides of the tire and to prevent crushing the

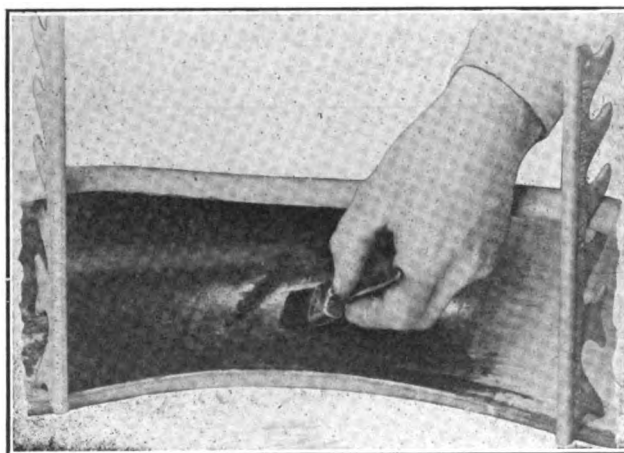


Fig. 3. After Casing Has Been Cleaned, Coat It With Vulcanizing Cement. Cemented Surface Should Extend at Least Six Inches All Around the Blowout.

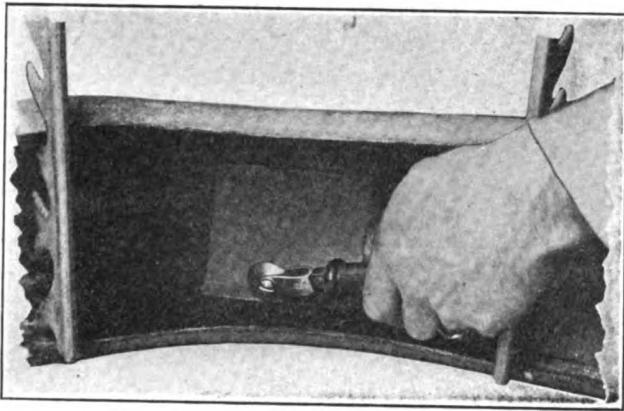


Fig. 4. After Cement Is Thoroughly Dry, Start Building Repair by Using a Piece of Repair Canvas About Two Inches Larger Than Hole.

bead, or clincher, soft rubber bead strips of triangular shape to fit in the groove of the bead are used under the tape.

The outside heater, which is connected to the steam chamber by means of a flexible hose—or in the case of an electric vulcanizer, is supplied with current through a cable—is next clamped lightly over the repair. It does not need to fit particularly close to the tire because the wrapping of tape shapes the repair and gives all the pressure that

is necessary. Thus one outside form will also fit all sizes of tires and it is unnecessary to have a different set of molds for each different size tire, with the result that many of the odd sized molds would seldom if ever be used. There is no profit in having idle equipment around.

It would be possible to cure the tire clear through with the inside form alone, just as it is possible to cure repairs made by the sectional method by heating only from the outside. But by using this outside form and heating from the inside and outside of the tire at the same time, the repair is cured very quickly—in from 40

minutes to an hour—and all tendency toward over-curing the tire is eliminated.

When the repair has cured for the proper length of time, which varies with the size and thickness of the tire, the tape and bead strips, which are not injured by the heat and should last indefinitely, are removed. After the tire is taken off the vulcanizer, any rough edges are removed with a rasp or a buff, and it is ready to turn over to the customer for service

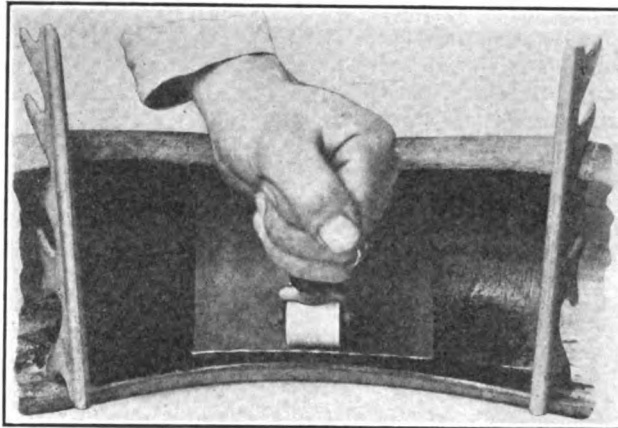


Fig. 5. The Second Layer Is Larger Than the First.

In case the blowout is nearer to the bead than illustrated in Fig. 1, exactly the same method is followed, except that the last layer of fabric is brought clear around the bead and up the outside of the tire for an inch or so as shown in Fig. 9. This gives the rim of the wheel a chance to help hold the canvas in place and makes an exceedingly strong repair—one that is

far superior in appearance to one made by stripping off the tread and replacing it, as some repairmen still do.

In case the tire has a pattern molded on the tread, as is often the case, the following scheme enables one to make repairs which duplicate the rest of the tread:

Take a piece of canvas wide enough to cover the full width of the tread for about a foot and apply enough layers of raw rubber to one side of it to

make the rubber an eighth of an inch thick, or whatever thickness seems necessary to fill the depressions in the tread of the tire.

Put the tire on the vulcanizer so that a good, uninjured part of it comes over the heater. Place the prepared canvas pad, well dusted with soapstone, on the tire, wrap it with tape, apply the outside heater and cure for half an hour. The pad will take a perfect impression of the tread pattern as shown in Fig. 10.

To use it, build the tire repair up in the usual way. When the repair is ready to vulcanize, this pad or pattern is placed over the repair before the tape is wrapped on. The repair will then be forced to conform to the pad and the result will be that the original tread pattern is duplicated over the repair. The pad may be saved for future use.

While there are several other methods of repairing casings which have also been in general use for many years, the "wrapped tread method" has been selected for description on account of its simplicity and economy and because it is especially adaptable to the requirements of the repairman who wants to start into the business with the least possible outlay, as well as of those who wish to do every kind of repairing that is considered practicable and profitable to handle in the garage.

Speaking generally, the sectional method of repairing casings, and the methods of retreading will only interest a compara-

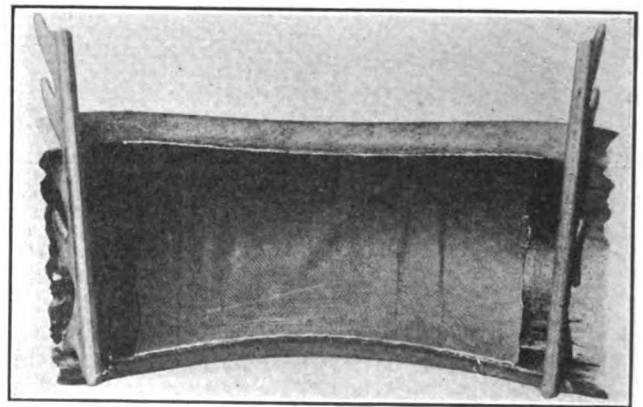


Fig. 6. Appearance of Inside of Tire After Final Layer of New Canvas Is in Place. Four or Five Layers Are Used, Depending on the Size of the Tire.

tively few repairmen in the larger cities where sufficient of that class of repairs can be secured to make the installation of the expensive, complicated equipment, and the employing of expert workmen a profitable undertaking.

### Motor Expert Defines Fifty-seven Varieties of Motor Knocks.

There are about 57 varieties of motor knocks according to H. Clifford Brokaw, motor expert. Perhaps the most frequent cause, Mr. Brokaw states, is that which comes from carbon in the cylinders. There should be no carbon there, but faulty car-

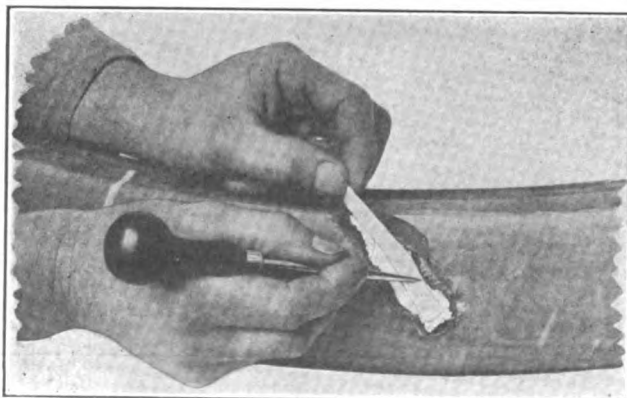


Fig. 7. Fill Hole on Outside of the Tire With Scraps of Tread Stock, Which Do Not Necessarily Have to be Cut to Fit, as the Rubber Flows When Heated.

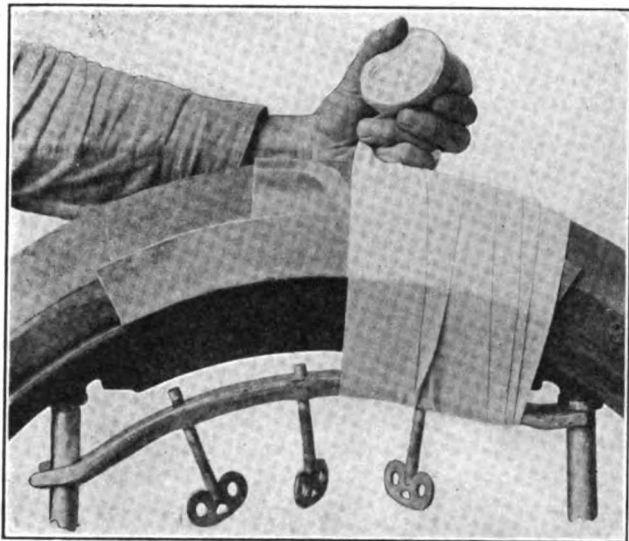


Fig. 8. Casing Is Placed on the Inside Heater and Wrapped With Tape, Which Upon Tightening the Tension Screws Gives an Enormous Pressure.

buretion, faulty lubrication, and faulty compression do produce it, and many engines, even on the high grade cars, have a tendency to accumulate carbon, partly due to the poor grades of gasoline of the present day.

Most high power motors are constructed for as high compression as possible, almost to the point of preignition; then when a film of carbon forms in the com-

haust valves, due to gummed oil, make an elusive knock because the stem does not spring back on the push rod properly, and when the two meet there is a thump.

Lean mixture or over-advanced spark does not cause knocks, though that

not all knocks are damaging to the motor. As some, such as a loose connecting rod bearing, loose cylinder, lack of lubrication, or a broken moving part, might cause immediate damage to the motor, it is best to find out what is at fault. Shut down the engine until you know one of these things is not making the noise. But a piston slap, though noisy, nor a clicking oil pump is not going to break up the machine.

Some engine knocks come with the motor—the manufacturers have not thought it necessary to eliminate them as they are harmless. Sticking ex-

timing gear teeth; cylinder loose on base; timing gears loose on shaft; engine loose on frame; piston too small, causing slap; poor pushrod adjustment—gap too large, sticking valves; spark-plug too long, touching valve; magneto coupling loose; fan-belt coupling striking pulley; fan blades striking somewhere; worn cylinder; bent crankshaft.

Faulty ignition: Spark advanced too far; spark too late, causing overheating; short circuits in ignition system causing irregular spark; spark-plug points defective and overheating; plug in poor location; wrong timing—too late, too early, wrong order; dirty distributor, which diverts current.

Faulty carburetion: Preignition, due to excess of carbon; rich mixture causing overheating; lean mixture causing worn parts to knock.

Faulty lubrication: Lack of oil; poor quality; excess, causing carbon deposits.

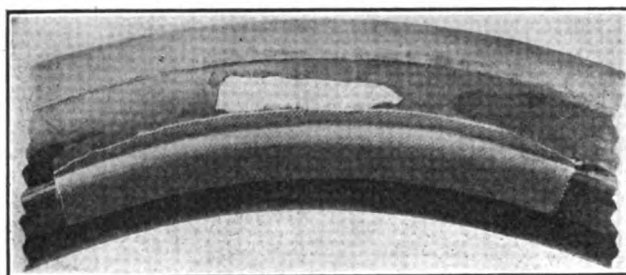


Fig. 10. When Blowout Is Close to Rim, the Last Layer of Fabric Is Brought Clean Around Bead and Up Side of Casing.

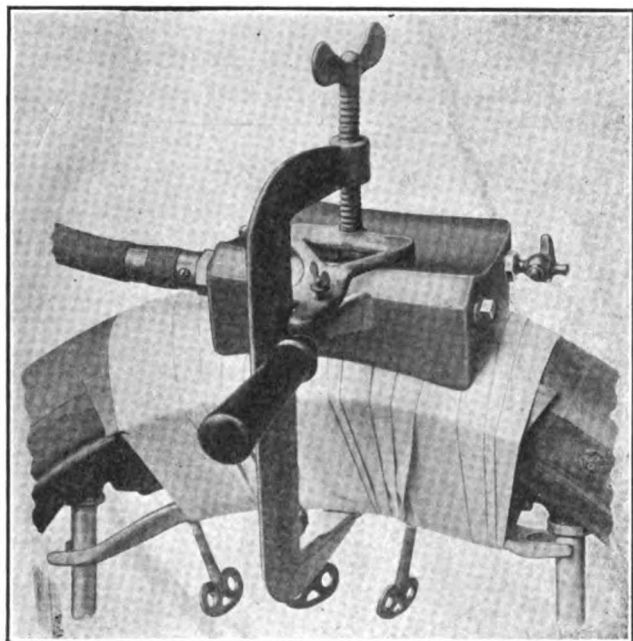


Fig. 9. Then the Outside Vulcanizing Plate Is Applied.

bustion chamber it raises the compression so that there is preignition and a knock.

In one instance, after many trials, a knock was cured by putting a 1/4-inch fibre gasket under the cylinder, raising it and lessening the compression. There were other adjustments to make such as the water connections, valve push rods and things of that sort. But the carbon knock was stopped.

Not every knock comes from carbon and

in connecting-rod; wristpin out of line with crankshaft, causing side slap; piston ring loose in slot or broken; cam follower guide worn; cam loose on shaft; flat spot worn in cams; flywheel loose where keyed to crankshaft; flywheel out of balance; worn and broken

is a common statement. They do exaggerate and bring to our attention other faults, such as worn pistons of cylinders and other wears which become audible.

Mr. Brokaw has compiled this list of things which have been found to produce knocks:

From mechanical looseness, due to improper adjustment or wear; loose crankpin bearing of connecting-rod; crankpin bearing out of round; main crankshaft bearings loose; bearings too tight; wristpin loose in piston or

Overheating engine: Fan not working; pump parts not revolving; radiator clogged; pipe line clogged; rubber hose defective inside, blocking flow of water; ignition timed too late.

Faulty compression: Engine designed with too high compression, causing preignition when throttle is wide open.

There are other things which cause knocks, but those just given are the common causes.

### Oil and Gasolene Production.

According to a recent bulletin issued by the National Automobile Chamber of Commerce, oil is being produced at a rate of 454,000,000 barrels yearly. The latest government reports show that the oil output during June was 37,219,000 barrels, or at the annual rate of 454,000,000 barrels.

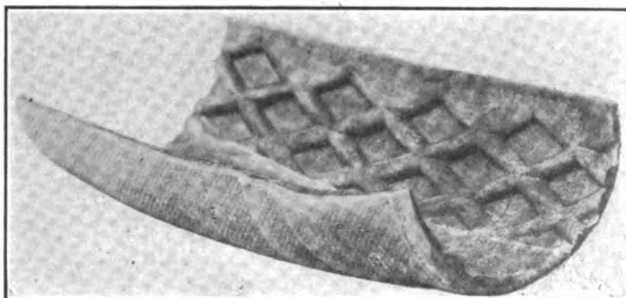


Fig. 11. Home-Made Mold Used for Saving Tread and Thereby Improving the Appearance of Repairs.







# Soldering Notes for the Repairman

Preparation of Fluxes and Selection of Proper Bits for Work—Repair of Radiators; Repairing, Installing, Inserting and Cleaning Tubes—Replacing Lower Tank, Bending New Overflow Pipe—Use of "Sweating" Process

By J. N. Bagley

Solders are commonly known as hard solder and soft solder. Since soft solder is the most common form, we will devote our attention to this process entirely. Soft solder, also called "tin solder" or "white solder," consists of readily fusible metals or alloys and does not possess any great amount of strength. Soft solders are easily handled on account of the ease with which they are melted. Most soft solders in use today are composed of tin, lead-tin and alloys of tin, lead and bismuth. The quantity of bismuth determines the degree of hardness.

Plumber's solder, commonly known as "half-and-half," is made of one part tin and one part lead. This solder melts at about 370 degs. Fahr., and is used for wiping joints and for other purposes. However, it can be used in uniting metals where strength is not needed.

Ordinary solder for general use for the

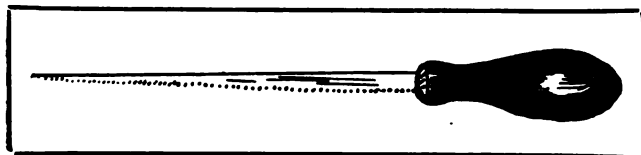


Fig. 2—Soft Back Blade Saw with Handle Is Handy Saw for Cutting Tubes.

soldering bit is made up of five parts tin and three parts lead and melts at about 350 degs. Fahr. Other variations of these mixtures are used with the addition of bismuth for blowpipe work.

## Preparing the Flux.

No one flux can be assigned to one metal as being particularly adaptable to that metal for all purposes. The nature of the solder used, as well as the kind of metal on which it is used, determines the flux which is best adapted for the purpose. The fluxes generally used in the soft-soldering of metals are powdered resin, or a solution of chloride of zinc, alone or combined with sal ammoniac.

The common method of applying the resin is to powder the resin and apply to the work by means of a swab or brush. If a liquid resin solution is desired, the resin may be dissolved or cut in alcohol to about the consistency of ordinary varnish. This preparation, when applied to the sur-

face to be soldered, dries out, leaving a thin coat of resin just where it is desired. This flux is very useful for highly polished surfaces as it contains no chemicals or acids which will attack the surface of metals.

Ordinary acid solution may be made by placing three parts of hydrochloric acid and one part of water in a lead, glass or wooden vessel, and slowly adding small pieces of zinc as long as any action of the acid on the zinc may be observed. The various suitable and convenient containers for cutting the acid may be made in the repair-shop from a hard rubber jar taken from a discharged storage battery.

Always put in more zinc than the acid will dissolve and allow the solution to stand for several hours, or until well cooled, after which a test should be made to see that there is sufficient water in the solution. To make this test, a small quantity of the solution is removed to a clean dish and a bit of clean zinc dropped in. Add a few drops of additional water and see if any chemical action upon the zinc follows the addition of the water. Should a chemical action be set up, the original solution should be diluted with water until further addition does not have effect upon the zinc. Pour off the clear part of the liquid for use. Care should be taken that

the sediment in the bottom is not transferred with the liquid.

A variation of the ordinary acid solution is obtained by dissolving the zinc in three parts of common muriatic acid with-

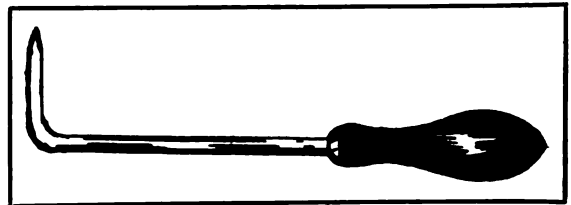


Fig. 3—Type of Drift for Tapering Ends of Section to Be Replaced.

out the water mentioned in the previous solution. After the acid has dissolved all

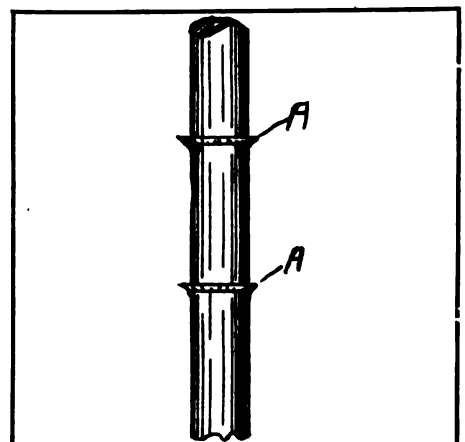


Fig. 4—(A) Manner of Inserting Section After Ends Are Treated with Drift.

the zinc possible, pour off the clean liquid as before and add a solution made by dissolving six ounces of sal ammoniac in a pint of lukewarm water. To this solution add three or four ounces of chloride of tin which has previously been dissolved in another pint of water. These quantities, when combined, will make about one gallon of stock solution, but may be cut down proportionately for smaller quantities.

The combining of the solutions mentioned will cause the final solution to be a little cloudy, but this may be readily cleared by the addition of a few drops of hydrochloric acid. Care should be taken that no more acid be added than is absolutely necessary to clear the solution or the effect of the

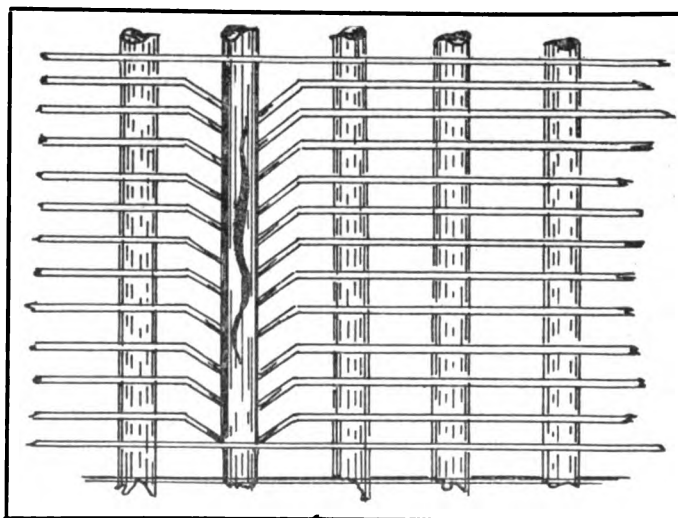


Fig. 1—Insert New Section Large Enough to Telescope Old Tube—Solder Crevice When Section Is In Place.

acid will be impaired. The advantage of this solution over the solution previously mentioned is that it will not spatter when soldering copper is applied to it, and will also allow use of a grade of solder

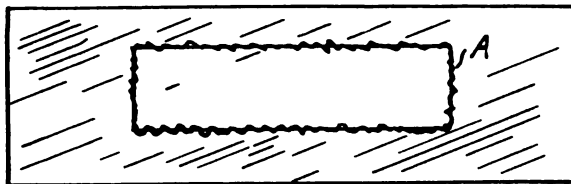


Fig. 5—Ordinary Way of Running Seams In the Radiator Tank.

such as the plumbers use for wiping joints.

Much care should be taken to see that all surfaces to be soldered are clean and free from any material or foreign substance which will prevent the solder from sticking to the work. If the work to be soldered is of such a nature that it can be dipped, a pickling bath may be used and the work submerged until it is clean and bright. All work can be brightened by scraping or filing or by the use of emery cloth.

For small work the solder is applied to the bit instead of to the work. A small amount of solder may be picked up on the tinned part of the hot soldering iron and thus carried to the place to be soldered. If the surfaces are cleaned and properly fluxed, the solder from the bit will readily flow over them and adhere solidly, but if there

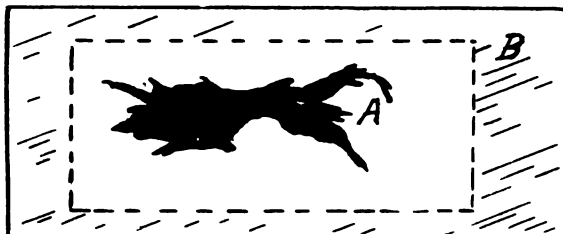


Fig. 6—(A) Irregular Fracture In Tank. (B) Patch to Cover Fracture.

should be foreign substances clinging to the surface, the solder will not lay smooth but the surface will have a pitted effect.

When the work to be soldered is large and heavy it will be necessary to feed the solder to the seam by melting the bar on the top of the soldering bit from which it will readily flow along the seam.

#### Selecting the Proper Bit for the Place.

Soldering bits are usually made of copper and are sold in pairs, the sizes varying from a few ounces to many pounds, depending entirely on the work for which they are intended. All irons are tinned on the point.

To tin a bit it should be heated hot enough to melt solder easily. The point of it should be filed bright while hot and rubbed through a mixture of solder and sal ammoniac spread on a piece of tin, or melted into a cavity made in an ordinary brick.

This action will provide a thin coating

of solder over the point of the bit as fast as it has been filed.

Bits should not be heated too hot or the thin coating of solder will be consumed, and it will be necessary to repeat the tinning operation before the bit can be used. The bit should be kept sufficiently hot to produce smooth work. That is the reason it is necessary to have two bits of the same shape and the same weight—that one may be used while the other is being heated. A gasoline blowtorch, such as is

found in the ordinary repair shop, will answer very well for heating the bit. How-

ever, many tinner's prefer the charcoal furnace instead. Soldering bits should not be heated in a soft coal fire unless it is the last resort, for the tin will vanish from the copper almost as soon as the proper degree of heat has been reached.

Now that we have talked about the bits, fluxes, and solders, we will put it to practical use and take up the repair of the radiator. We have not, however, mentioned the torch, which is a valuable asset in making radiator repairs. Therefore, just at this time we will dwell upon the torch.

The torch is used for flowing solder into close places where the bit cannot be used, for tearing down the radiator and getting it in shape for repairing. Special care should be used in the manipulation of the torch or some of the delicate tubes or fins may be destroyed as the heat is sufficiently intense to melt light metals. The torch is used with a large broad flame for header work and should be kept constantly in motion in a circular path.

For repairing tubes or small leaks in the tank proper, the flame should be adjusted to a small point directing the heat to the spot to be repaired, and moved up and down, or sideways as the case may be, thus flowing the solder well into the crevice or joint.

In case the work is dirty, the torch can be used quite successfully for cleaning, if the flame is again adjusted to the broad or "flood" flame. When dismantling, the object is to flow the solder, which binds the parts together and at the same time brush the solder out with a long brush. A very good plan is to take a weak solution of soldering acid as described, re-

duce the water, and apply with a brush before applying the heat. This will cut the scale loose and the flame from the torch will seem to consume it.

#### Repairing the Leaky Tube.

A broken or leaky tube many times can be repaired by soldering on the outside, but it is usually advisable to replace the tube with a new one. A very satisfactory repair can be made, however, by cutting out the piece and inserting a new section large enough to telescope the old tube, the crevice being soldered when the section is in place, Fig. 1.

When the entire tube is to be replaced, the procedure will be quite a little different than when the tube is to be repaired in

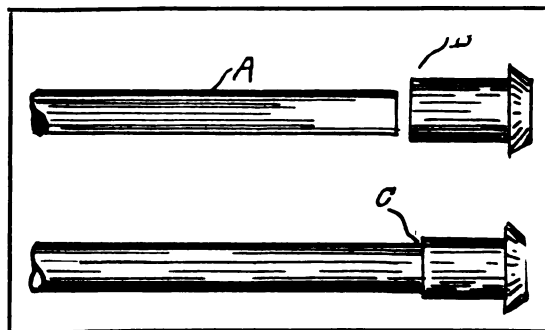


Fig. 8—Using the Sweating Process In Uniting Copper Tube and Union.

the center of the core, or when it is near the bottom header. In case the tube is broken near the center, the repair can be made as already described by inserting a section.

Take a pair of snips or a sharp knife and cut the fins just in front of the tube, turning them back from both sides until the tube is well exposed. Use a hack saw blade having about 36 teeth to the inch for cutting the tube above and below the rupture.

A very satisfactory saw for cutting tubes can be made in the following manner: Take the soft back blade saw and place a handle as shown in Fig. 2, allowing the blade to project about three inches and tape the back from the handle to the point as shown. This sort of a device will answer very well in most cases as it will go between the tubes from either side nicely.

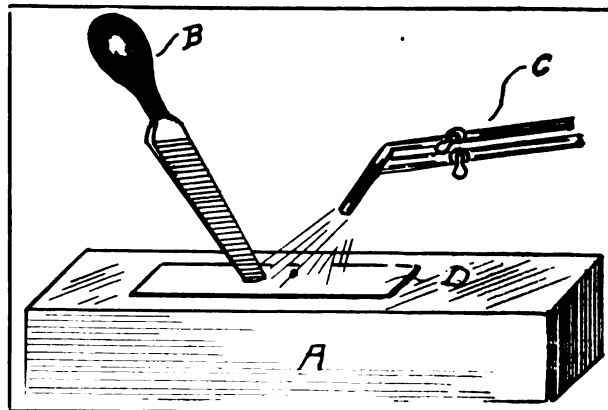


Fig. 7—(A) Tank; (B) Tool for Pressing Down Patch; (C) Torch for Applying Heat; (D) Patch.

Should there be ridges of solder on the ends of the tube, it will be necessary to remove them before attempting to place the new section. To do this, apply the blowtorch to the end of the tube until the solder flows freely and wipe the end quickly with a tuft of cotton dipped into the flux.

This operation will remove all surplus solder leaving a well-tinned end for attaching the section.

Now, that we are ready to place the section in position, a very good plan will be to slightly warm the ends and dip them into the flux to clean them, after which the end can be dipped into molten solder and the tube will be tin coated inside and out. Should the solder hang in bunches or small bubbles after taking from the plunge, apply the torch again to the tube until the solder flows freely when, with a quick swish, the surplus solder can be removed.

It will be necessary to taper the ends of the section to be replaced in order that it will start to telescope easily. This can be done, making a tool as shown in Fig. 3, which might be called a type of a drift. To use the tool, insert the point into the tube and move sideways until the end is rolled out in sort of a bell fashion.

The section of tube used for repair should be cut  $1/8$  to  $3/16$  inch longer than the section removed as this will allow for the support at either end. Fig. 4, at A, shows the manner of inserting the section after the ends have been treated with the drift as explained.

As shown in Fig. 4, the one end of the section and the one end of the tube are tapered. This leaves both bell-shaped ends in such position as to take solder easily, whether the bit or the torch is used to finish the job.

Bend the fins back into place and solder them to the tube also, and the job is complete.

#### Installing the New Tube.

We have now taken up, in a general way, the repairing of the tube where the section is to be used and we will now try and treat the installation of the new tube in a non-technical manner.

When it is necessary to install an entirely new tube, the lower tank should be removed in the following way: Melt the solder holding the overflow pipe in position and bend it so it will not interfere with the work. Detach the reinforcements from the supports by the use of the torch, together with a thin chisel. Sometimes the reinforcements are soldered together, in which case it will be necessary to separate them so they will not seize as they cool.

Follow down the side seams with the torch, removing the solder with a stiff brush as it is melted; also tap the seam lightly to separate the metals sufficiently to prevent seizing as the torch is passed on, leaving it to cool.

After all of the seams have been gone over carefully in this manner, play the torch over all the surface rapidly and at the same time pull and work at the water connection until the parts separate. The tank is now off and the ends of the tubes can be worked upon without interference. The tube can now be melted loose from the header and fins and removed from the radiator proper. After the tube is loosed from the header, play the torch rapidly up and down the tube until the solder is melted when the tube can be drawn out very easily.

#### Inserting the New Tube.

Care should be exercised in inserting the new tube that it is not jammed or crushed for they are of very delicate construction and are very easily damaged. A very good plan is to use a small rod that will just fit inside the tube for pushing it into place, when the rod can be withdrawn. When the tube is in position, solder it by flowing solder on the inside of the header with the torch or bit. Care should be exercised not to disturb the tubes lying next to the one being installed.

If, after soldering the tubes to the header, any of the fins are loose, they should be tacked to the tube with a bit of wire solder applied with a small bit. If there are a number of tubes to be installed, a very good plan will be to remove the top tank wall and reset all the tubes from the inside of the tank. However, it can be done from the outside if preferred.

#### Cleaning Tubes.

Many times it is necessary to clean the tubes to allow a free circulation of water, and to prevent the engine heating. Tubes may become clogged from the use of some of the dopes "never leaks," or it may be that in the making, solder has flowed over the ends sufficiently to check the free circulation of the water.

If draining the water and flushing the radiator does not overcome the trouble, it may be necessary to remove the bottom tank and force a wire through the tubes to remove the obstruction. When all the tubes have been cleaned, replace the header and flush again with water, testing the radiator before replacing on the car.

#### Replacing Lower Tank After Repairing.

In nearly every case the heating to remove the lower tank disturbs the solder which holds the tubes in the header, in which case it will be necessary to reset the tubes before replacing the tank. There are a number of ways of doing this job, but a very good plan is to stand the radiator on edge and while the heat is evenly applied, brush off the solder with the stiff brush.

Should there be spots show up that are not tinned, a little acid flux should be applied and well tinned before the process of resoldering is undertaken. After all spots have been taken care of, take the work to the water tank and scour it thoroughly with the stiff brush, when it can

be returned to the repair bench for the final treatment.

Place the radiator in a position best for the work and again use the flux and the brush, being careful to reach every point to be soldered. Now adjust the torch to give a full broad flame covering three or four rows of tubes at a time and moving it with a circular motion during the heating process. As soon as the solder that is clinging to the tubes and header flows freely, apply a sufficient amount of new wire solder to seal all the crevices and pass the torch flame to another section of the radiator and repeat the operation until the entire header is gone over and all tubes are made tight.

It is an easy matter to tell whether or not the tubes are soldered sufficiently, for the solder will seem to rise upon the tube a trifle above the level of the header plate. Should there appear a black spot on either side of the tube, it is, no doubt, a place where scale has not been removed or an air hole caused by moisture. At any rate do not seal up the job until it has been taken care of, or it may be necessary to take the job down the second time.

Now that the tubes are made secure to the header, the next step will be to replace the tank, either top or bottom, as the case may be. Clean the tank seams with the torch and brush as already explained in cleaning the tubes, straightening any places with solder. Then with a light hammer, gently tap the tank along the seams until the two surfaces come in contact.

Use the iron for running the seams, beginning at the end and running along the side for about one inch. Take the other end in the same manner, after which the long seams can be closed up. Extra precaution should be used in working around the water connections to see that no air pockets form. The radiator should be placed flat while running the long seams. The supports, as well as the over-flow pipe, can now be forced to position and soldered.

#### Bending New Over-Flow Pipe.

Quite often it is necessary to form a new over-flow pipe that is very irregular in shape. To bend this as it comes in the stock, cannot be done successfully as it will crush when making short curves and obstruct the flow of the water. A very good plan is to cut the stock the desired length, or nearly so, and after plugging one end with a suitable size bottle cork, fill the tube with melted resin. The tube, as soon as cold, can be bent to any desired shape just as one would bend a wire.

When it is shaped to meet the requirements, take the torch and play the flame back and forth the length of the tube and the resin will run out leaving the tube the desired shape ready for use. This method of bending and forming copper tubes will be found valuable in many instances aside from that just mentioned. Oil tubes, gasoline lines, in fact, many irregular copper

(Concluded on page 38.)

# Welding, Cutting and Brazing Practice

Welding of Larger Automobile Parts Has Been Previously Dealt with, but Especially in These Days When Production Is Difficult, the Value of Repairing Small Parts Is Not to Be Overlooked—The Way to Weld Valves

By David Baxter

In the past this department has dealt chiefly with the welding of the larger and seemingly more important automobile parts, such as cylinders, gears, cylinder heads, crank cases and transmission cases. In the main, this was due to the fact that

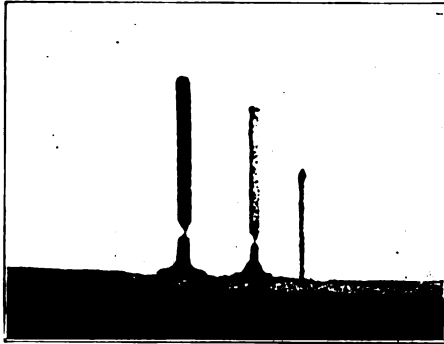


Fig. 1—Stem of Larger Valve Is Welded to Smaller One. Method of Grooving.

the need for repairing is more noticeable—that is, the welder is more often called upon to make repairs on the larger parts, mostly because the smaller articles are more easily replaced and when not compared with the larger ones appear to be less expensive to the car owner.

In fact, it seems to be a quite popular belief that it is not worth while to attempt the repairing of the less prominent automobile, truck, and tractor parts and accessories. This belief argues that the small parts can be replaced by new ones cheaper than by repairing. All of which may be true in some cases, depending upon the way you look at it.

If the replacement consists of merely jerking out the damaged part and inserting a new one, it is, perhaps, cheaper to do so. But if it happens, as it very often does, that there is no new piece at hand and that it takes a week or a month or more to get a new part from the factory, then the saving effected by repairing the worn or broken piece may be many times the cost involved in having it repaired.

There is also the item of material wasted. By junking a small automobile part that could easily be repaired, we are committing almost a crime in these days when production is needed so badly; every piece that is thrown away puts some factory just a little farther behind.

But it is useless to enumerate the reasons why it is better to repair small parts than to buy new ones. The element of time saved to the customer will no doubt furnish good and sufficient argument for

repairing the defective part instead of throwing it away.

It was stated in the beginning of this discussion that smaller automobile parts are seemingly less important. In reality, some of the smallest are often the most important. One of these is illustrated in the engine valve, and especially the tractor valve. It is a small device, but it is of vast importance. In fact, it could be called the heart of the engine, which infers that it should always be kept in good shape if it is to give the best results.

To attempt to dig into the choice and care of valves would involve us in a discussion much too lengthy for the space permitted. And besides, to discuss valves except in relation to the welding of them would be outside of the offices of this department.

Valves of all kinds and sizes may be repaired with the oxy-acetylene torch, but it is not always advisable to do so except as a makeshift repair to tide the customer through a rush spell. Perhaps it would be better to say that the repair is not guaranteed to be as good as a new valve, for, while many of the valves may be welded so they will give satisfaction, others are welded solely as a sort of makeshift.

Of course, the welder should know something about the valves, as to whether or not they are fit to be repaired at all. He should know if they are too badly "burned," too badly warped, too badly "pitted," or too badly worn, to make it pay to repair them.

Of the four conditions, the burned valve is probably the most difficult to repair, since the metal in the burned region has been rendered lifeless or non-metallic, so to speak. The burned portion cannot be melted and mixed with filler metal. If it is located in the valve stem, it should be entirely removed before attempting to weld, either by cutting a section out of the stem or by grinding it deep enough to remove the metal that has been burned.

If the head or seat is badly burned, it is no doubt better to consign the valve to the scrap pile. If the head or seat is burned merely in spots, or pitted, as it is termed, it may be welded in fair shape, providing the pits are first melted and scraped out.

Warped valves are rather difficult to repair. About the only thing to do is to heat them all over and fasten them in a vise to cool. They cannot be hammered

much unless a soft hammer is employed.

The welding of a worn valve depends upon the location and extent of the worn spot. Sometimes the worn portion may be built up with new filler metal which is machined to size afterward. Sometimes it is better to cut the stem near the head and weld on a new one.

This latter method is the one usually employed in most valve repair jobs since most of the worn valves are worn the full length of the stem either along one side or all around. When thus worn the only practical way to make the repair is to cut off the old stem and weld on a new one. But if the worn portion is merely a groove around the stem, it may be repaired by filling with new metal. Pitted spots on the stem are welded the same way.

In nearly all cases the welded valves have to be machined in a lathe if they are to be serviceable at all, especially if a permanent repair is to be made. If the repair is to be merely a crude affair, the

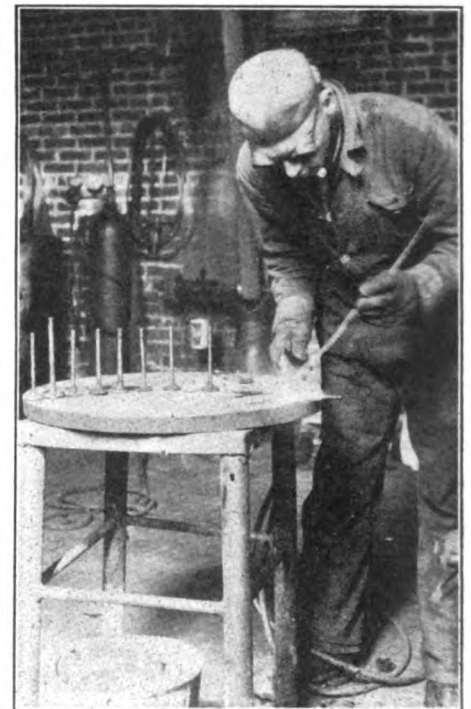


Fig. 2—Here the Operator Is Seen Welding on a New Stem.

welds may be ground fairly accurate on an emery wheel.

In taking up the repairing of valves, the welder should know that besides the many different sizes and designs, the valves are made of several different kinds of metal,



some of which are difficult to obtain in the form of filler rods, or rods to use in replacing the old stems. In either event, the welder had better tell his customer of the fact—and if he must make a new stem out of common mild steel, he should tell the customer it will not last long.

The usual way to overcome this difficulty is to weld the stem of a discarded valve onto the one being repaired. When this is done, the stem of the discarded valve should be larger in diameter in order to furnish machining stock to obtain accurate size.

In this connection it is wise for the welder to save all discarded valves that usually collect about the shop. He will then have a chance to weld on a new stem that is very near the same steel as the damaged one. This is especially helpful where the valve is made of special alloy steel which would be next to impossible to obtain in filler form unless the shop was a large or particularly well-equipped establishment.

But let us take up some of the different valve welds more in detail: First, consider the valve with a worn stem that is to be replaced with a new one; then the stem that is burned or worn in such manner as may be filled without removing the stem. The accompanying photographs and drawings will no doubt aid in giving a clearer understanding of this text.

In the first instance, the entire stem is removed from the head, either by sawing or by melting with the torch. Unless the stem is worn close to the head, an inch or so of it is allowed to remain on the head. This inch or so is now ground wedge

each side of the stem. The section of the new stem is wedged in the same manner. This new stem is made by cutting sufficient length from a discarded valve a size larger than the one being replaced. By having it a size larger, it can be machined to exact size, thus truing it at the same time in case it is not welded straight.

The welder may use a piece of mild steel or special steel to make the new stem, but he runs more risk of getting a poor grade stem than he does when using the stem of a cast-off valve, especially if both valves belong to the same make of engine. If he does much business along the line of valve welding, he may keep on hand a supply of special alloy steel filler rods and stem rods.

A handy way, then, is to save the stems of the larger valves to use in welding the smaller sizes. The smaller valve stems can be used as filler metal for welding the others. The principle of this idea is illustrated in Fig. 1, which also shows how the stem parts are grooved for welding. Both parts of each stem are wedged or pointed, ready to be connected by the melted filler metal.

The welding of a new stem is probably best accomplished by placing both parts upon a leveling plate where they can be rolled along as the welding proceeds. Both pieces are placed upon the table or leveling plate, but the valve head should extend out over the edge of the plate or should rest in a convenient slot. Both stem parts are to be in line before welding. It may be necessary to place a few strips of asbestos beneath the short stem section in order to bring it to alignment with the other, especially if the other is somewhat larger.

Fig. 2 shows the weld being made with the valve head in a slot and the stem projecting over the edge. This is a position that need not be maintained, however, since the valve may be shifted to other parts of the plate after it is partially welded.

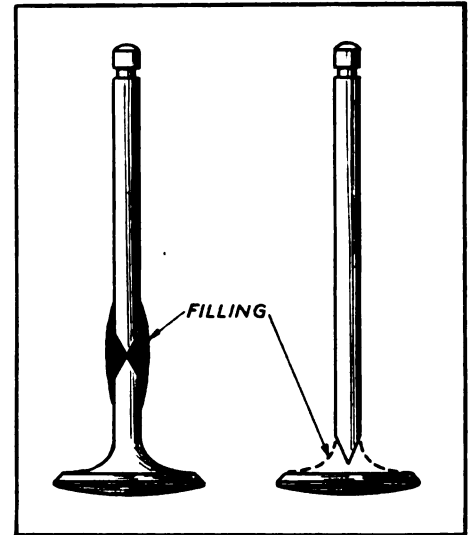
When the valve parts have been lined up, a neutral welding flame of a small size torch is applied to the bottom of the uppermost groove. Here it is slowly revolved until the groove bottom starts to melt, then the tip of the flame is swung back and forth across the groove until the groove bottom melts and runs together.

At this time the filler metal is introduced by bringing the end of it in contact first with the flame, then with the melting weld. Enough filler is melted to over-fill the groove. Be very careful to see that the sides as well as the bottom are in a melting state when the filler is applied.

The over-filling of the groove provides a supply of metal that is spread out and rounded over the smaller portion of the stem to furnish machining stock. The flame is played over the surplus metal to cause it to settle into the valve metal.

As soon as one groove is filled and rounded over, the valve is turned to bring

the other groove upward. This is then treated in the same manner as the first groove, care being taken not to burn the metals by a too concentrated application of the flame. Be sure the metals are ready for each other when the filler metal is



The Way In Which New Stems Are Welded on to Old Portions.

applied. The welded valve is then ready for the machinist's part of the work.

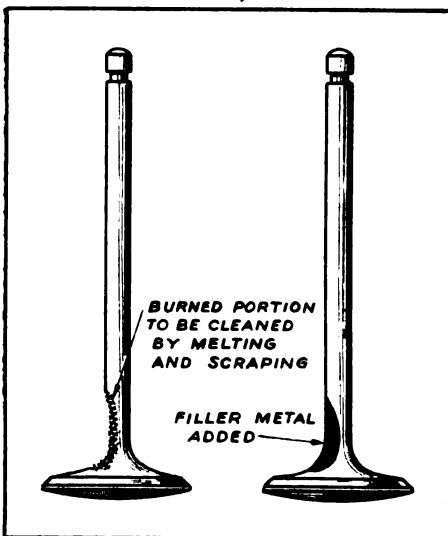
The filler metal is applied with a dipping, twisting motion as it settles into the weld. For the average valve, a small diameter filler rod is used since a larger one supplies too much metal. When using discarded stems for filler, the operator often finds it inconvenient to obtain stems that are small enough and it may even be necessary to grind them to smaller diameter.

This is no drawback, however, since he needs such small quantities of filler to each weld and will, therefore, need to grind only an inch or so of each stem for each weld. Of course, the discarded stems are too short to use by hand, so he will have to weld them to a longer rod of any kind of filler, which serves as a handle, or the short pieces may be handled with tongs.

To repair a stem that is worn in one small portion, or is burned a little on one side: First, the worn spot is melted and filled the same as if it were a groove, with a surplus of filler metal piled on top of the weld and thoroughly soaked into it, well-rounded and smoothed by the pressure of the welding flame. The same kind of filler applies to this condition as when filling the V-grooves.

In filling burned portions, the flame is played over them to bring them to a molten stage. Then the filler rod or a special scraping tool is used to clean the spot of all burned metal. This burned metal is scraped or dug out of the damaged stem until the purer metal is exposed. A quick, deft manipulation of both flame and scraper is essential in this cleaning process. The damaged stem is either fastened in a

(Concluded on page 38.)



Method of Cleaning and Filling Burned Valve Stems.

shape. If none of it is left, the scar is ground smooth. Particular care should be taken if the stem is removed by melting.

The short end of the stem is made wedge shape so that when it is fitted to a new stem, the juncture will form a groove on

# Practical Hints for Shop Mechanics

## Polished Steel.

When polished iron or steel loses its luster, it may be restored with ammonia, soapsuds, and a stiff brush. The parts are then rinsed thoroughly and dried by heat. Next, a copious amount of sweet oil is applied, and then powdered quicklime is dusted on. The lime is permitted to stay on for two days and is then cleaned off with a stiff brush.

The metal is polished with a softer brush and with soft cloths until the lustre is restored. If the lime is left on, the iron or steel may be kept from rusting almost indefinitely.—R. G., S. C.

\* \* \*

## Hood Finish.

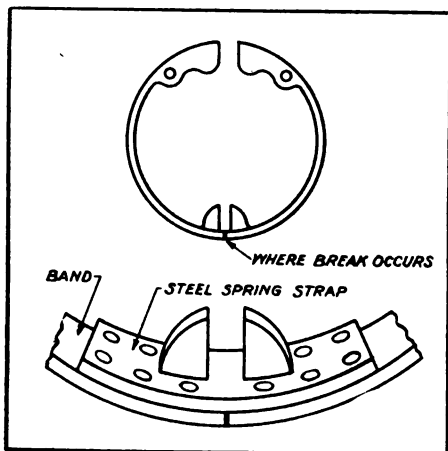
The hood of the car is most likely to suffer damage before the rest of the body finish. This is true because of its being exposed to heat from the engine. Part of this trouble can be obviated by fitting an asbestos lining inside the hood.

The hood should be wiped off carefully after it has been exposed to rain, for rain tends to spot the finish of the hood because it is hot. As a matter of fact, the entire body finish will be better preserved if it is wiped off after coming in from a rainstorm.—D. P., Mich.

\* \* \*

## Brake Band Repairs.

The point at which the brake band of an automobile usually breaks is opposite the opening, as shown in the accompanying illustration. I found that by making a repair at this place with a strap of spring steel riveted into place as detailed, the



A Way of Repairing Automobile Brake Band.

brake band was stronger than when originally fitted.

The spring steel at the break gives the band elasticity and its strength is equal to, if not greater than, that of the metal where

## ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

the break usually occurs. When I bought two new brake bands, I had them sawed in half at the point where the break usually occurred and had them joined in the manner described. They will, in this way, give better service.—C. H., Pa.

\* \* \*

## To Start Small Machine Screws.

Screws in difficult places may usually be removed easily enough, but in replacing them difficulty is experienced. Many times they are set in small recesses where the fingers cannot reach. The work of assembling can generally be greatly expedited by taking a length of fine wire and bending in a loop.

The screw is placed in the loop of wire and placed in position. After the threads have caught, the screw should be held with the screw driver and the wire may then be withdrawn. Soft wire should be used as it is easily withdrawn.—R. W. T., Mo.

\* \* \*

## Permanent Headlight Dimmer.

Get what is known as "ground glass substitute" from a photographic supply house. This material is composed of ether and rosin, and glass once painted with it stays frosted practically forever.—D. N., Mich.

\* \* \*

## Soldering Aluminum.

An ingenious method of soldering aluminum is as follows: Drill the surface of the aluminum with as many small holes as possible at a slight angle; drive in brass plugs that are a tight fit and smooth off the pegs even with the surface.

The surface should then be cleaned thoroughly and paste solder applied with a hot soldering iron, after which the two surfaces can be put together, heated, and treated exactly as copper or brass.—N. T., N. Y.

## Grinding Compound.

It is not very generally known that powdered charcoal mixed with kerosene oil makes a very satisfactory valve grinding compound in the absence of the regular product.

The mixture is applied in the regular way and the grinding carried out just as with ordinary grinding compounds. The charcoal produces a very fine surface and unless the valves are in unusually bad condition, requires little more than the regular compounds.—L. A., Cal.

\* \* \*

## Frosting Lenses.

I have found a simple method of frosting lenses. The following formula is used for making the frosting solution and into this the bulb of lens is dipped:

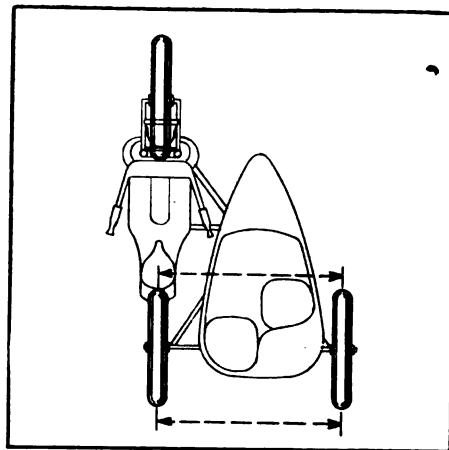
To a mixture of 24 ounces of ether and 18 ounces of benzine, add 2¼ ounces of sandarach and ½ ounce of mastic. If it is desired to produce colored light, coloring matter may be added to the solution to obtain the effect desired.

If the surface to be frosted is large and flat, the solution may be applied with a brush, but this usually produces a streaked surface. It is best to immerse the object to be coated if possible. The uncolored solution produces much the same effect as ground glass, but the frosting wears off with service and has to be renewed.—N. T., Cal.

\* \* \*

## Aligning Wheels.

If the wheels of a vehicle, particularly a side car motorcycle, do not run true, the motor is over-burdened as if pulling an extra load. If the side car wheel has a



Aligning the Wheels of a Motorcycle.

tendency to run toward the right, then, to make the motorcycle go straight ahead, it is necessary to keep the front wheel turned slightly to the left, and both the motor and the tires receive undue wear.

A method of aligning the wheels is to measure the distance between them at the points indicated by the dotted lines in the accompanying illustration. If they do not measure the same at these points, proper adjustment should be made on the cross rods.

In the case of an automobile, the test is the same although the adjustment is more difficult especially if the axles are bent.—C. H., Pa.

\* \* \*

### Setting the Nut.

Castellated nuts have a way of tightening up between notches. If the nut is screwed up to the notch ahead, it is too tight, while the notch back is too loose.

This trouble can be cured by a careful filing of the face of the nut so that it can be screwed to the notch ahead.—N. D., Mich.

\* \* \*

### To Frost Glass.

It is often convenient to frost bulbs and lenses, and here is a method by which this work may be done at home. To a mixture of 24 ounces of ether and 18 ounces of benzine, add  $2\frac{1}{4}$  ounces of sandarach and half an ounce of mastic. The parts to be frosted should be immersed in this solution for a few minutes.—L. A., Cal.

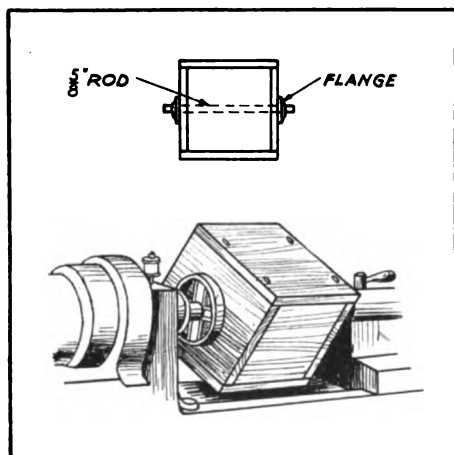
\* \* \*

### Tumble Box for Cleaning Parts.

To facilitate the cleaning of nuts, bolts, bearings, castings, etc., of rust or dirt, I use a tumble box made in the following manner:

The box is one foot square, made of one-inch lumber. A rod,  $\frac{1}{2}$  inch or  $\frac{3}{8}$  inch, runs through the box. The ends of the rod are threaded and a flange is tapped and screwed on both ends.

One side is hinged or screwed on for a



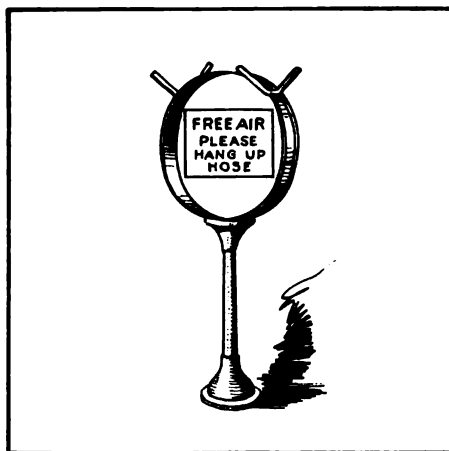
Parts Are Made "New" in the Tumble Box.

door to put parts in. Put in between the centers of lathe and run at slow speed. Use a few handfuls of cutting sand in with the parts to be cleaned and they will come out as good as new.—A. D. S., Ill.

### Rack for Air Hose.

A very serviceable and attractive rack was constructed for the "Free Air" hose in the following manner:

One-half of a Ford rear axle housing was used for the supporting pedestal. The large end or bell was placed down and fastened to the sidewalk with three bolts. An



An Attractive Rack for the Air Hose.

old clincher wheel rim was fastened to the brake flange by a bolt passing through the old tube valve hole. Two other holes were drilled through the old rim and forks made from flat iron stock were bolted fast.

These forks were made from pieces 11 inches long with a single hole drilled in the center. All bolts were set up snug and secured with lock nuts. A sign made from sheet metal was supported by wires within the old wheel rim. The rack was then painted in attractive colors.—K. R., Mo.

\* \* \*

### Spark-plug Cleaner.

It is comparatively easy to make an effective spark-plug cleaner as follows:

Get a piece of glass tubing about three inches long. In each end place a cork, and bore each cork to take the threaded bushing of a spare plug.

Fill the tube with sand and gasoline; insert the spark-plugs and shake the device briskly. The sand and gasoline will clean out the carbon in jig time.—L. A., Cal.

\* \* \*

### Cure for Chattering Brakes.

One of the common troubles encountered in the brake assembly is a tendency to chattering, which is extremely annoying. This is generally induced by a deposit of the burnt oil on the bands and it may generally be cured by applying hot kerosene oil to the parts.

If this does not serve, the only remedy is to burn off the deposits with a blowtorch. This operation is carried out by removing the bands and soaking them in gasoline over night and then applying the torch.

The propeller shaft brake is peculiarly liable to this trouble, as, if the transmission case contains a little too much oil, the ex-

cess lubricant is thrown through the shaft brushing on to the bands. If an application of graphite is used instead of oil for lubricating the brake bands, it will lessen this trouble.—L. F., Cal.

\* \* \*

### Bending Small Copper Tubing.

Frequently it is necessary to bend copper tubing in making installations on vacuum tanks and gasoline lines and small experimental devices. This is hard to do without having the tubing kink or close up at the bends.

Try greasing a piece of wire solder and inserting it in the tube before bending, allowing the ends to protrude. After the tube has been bent, it can generally be withdrawn, but if not, it may be melted out.—B. M., Mo.

\* \* \*

### When in Low Gear.

When it is necessary to employ the low gear for a considerable period, it is possible to obviate the overheating that would ordinarily result by keeping the mixture in the cleanest possible condition.—P. V., Ore.

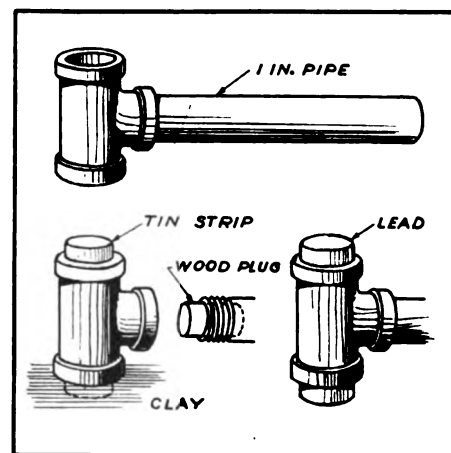
\* \* \*

### Quickly-Made Soft-Face Hammer.

We find a soft-face hammer has frequent use around the shop. It can be quickly made in the following manner:

Secure a  $1\frac{1}{4}$ -inch iron pipe T with a connection for a 1-inch pipe. Then use a piece of 1-inch pipe about 12 inches long for a handle. Before inserting the handle piece, close the end of the pipe with a wooden plug. Cut two strips of sheet tin, one inch wide, and insert into the ends of pipe T for a distance of  $\frac{1}{2}$  inch. One is required for either end. This will permit the lead face to project above the end of the T for a distance of  $\frac{1}{2}$  inch.

Set the lower face of the hammer on a



A Soft-Face Hammer Is a Handy Tool.

bed of moist clay and pour in the melted lead. After this has cooled, remove the tin strips with pliers and the hammer is ready for use. When badly battered, melt out the lead and repour.—P. B., Wash.

# Glimpses in the Garageman's World

It Is Important to Know What Kind of a Place the Other Fellow Has—  
On This Page Are Two Views of an Attractive and Conservative Service Station Which Furnish Ideas That Are Adaptable to Any Establishment

## They Say It Is "the Prettiest Service Station in Minnesota."

"The prettiest service station in Minnesota" is the comment of the majority of the tourists who visit the service station shown in the accompanying illustrations. It is operated by Mr. and Mrs. George Root in Rochester, Minn., where during each year more than 185,000 transients come for more or less lengthy stays.

The Roots bought the agency for the business from the Hawkeye Oil Co., of

During this first year, they also placed pumps in four garages in various parts of the city, from each of which are sold several hundred gallons each season.

Over the garage, the Roots have for their own use an apartment of five rooms and a bath, and at the rear of the station is a neat, thrifty kitchen garden, as well as a flower garden.

A pipeless furnace set in the center of the garage heats it and the office and living apartment. This arrangement eliminated the necessity of building a basement for the heating-plant.

Located on a plot 70 ft. by 84 ft. at the corner of two main streets close beside one of the best machine and repair shops in the city, the new station of tile construction with cream-white pebble-dash finish and dark red brick trim, is unusually attractive even among the many fine buildings in the neighborhood.

The company's name and trademark are, of course, conspicuously displayed, and its colors—red and white—are emphasized in the finish, trim and lighting of the building.

The touch of Mrs. Root's hand is seen in the arrangement of the living-rooms and office, also in the flower garden and in the large, well-kept flower-box placed in the arch at the end of the station and filled with red geraniums, marguerites and trailing green and white vines.

All in all, the station deserves the flattering comments of the tourists who patronize it, and proves conclusively that such a place can do a big volume of business, yet be scrupulously clean and attractive.

Mrs. Root, who is the bookkeeper for the agency, says that they expect to double the business during the year of 1920. Sunday, June 13, they took in at the new station \$694—the largest amount of business yet done in a single day there. At this rate, the home station alone would easily equal all the previous year's business.

The fact that there are two other filling stations in the city, and at least ten other garages where oils and gasoline of other brands are sold, gives some idea of the

competition which the Roots have to meet.

The company guarantees Mr. Root a substantial salary and pays a liberal commission on all business in excess of the amount sold to earn the guarantee. Mrs. Root receives a straight salary for her part of the work.

Through the arch of the filling station can be seen the window of the garage.

At the right in the photograph is the south entrance as well as that of the office.

The lower view shows the west entrance to the garage and the balcony to the living rooms above.

The Roots children are playing with some of their friends in the foreground of the lower illustration.

## Courtesy the Unwritten Obligation of Service Station.

"When a dealer opens up a service station," says one of the Clydesdale distributors, "he takes on an unwritten obligation to serve the public agreeably and pleasantly. If he is going to give service, it should be given graciously, or not at all.

"Many dealers are only too anxious to give their customers the best kind of service, realizing that they are but paving the way for future business. They will go to great lengths to do this, and spend thousands of dollars to thoroughly equip a service station with the latest sort of devices and machinery. They will occupy a central and costly location, and then turn round and completely offset these efforts by ignoring the human element—they will employ help completely lacking in the first attributes of courtesy and willingness.

"It is not enough to simply render service—this service must be gladly, freely, even joyfully given, it must be service which accommodates and does not aggravate the customer.

"As long as there are automotive vehicles, service for them will be required, and it should be every dealer's intention to see that the service is given with a smile, and is not construed as a great favor to the customer."

## Official Opening of the National Park to Park Highway.

On August 25 the official party started from Denver on the opening tour of the 4,500-mile automobile scenic highway, connecting the national parks of the West. Upon their return, the officials will arrange for the permanent organization of the National Park-to-Park Highway Association.



Filling Station and Glimpse of the Garage. Lower Illustration Shows West Entrance of Garage and Balcony to the Living Rooms.

Waterloo, Iowa, on December 13, 1918, and operated for one year, a one-pump station connected with a tire shop.

Of the 52 agencies selling in both wholesale and retail quantities for that company, the Roots did the largest volume of business during the year from December 13, 1918, to December 13, 1919. During the seven months of the year when the Minnesota climate makes motoring pleasant, they sold \$100,000 worth of oils and gasoline for cash and an additional \$48,000 worth on credit.

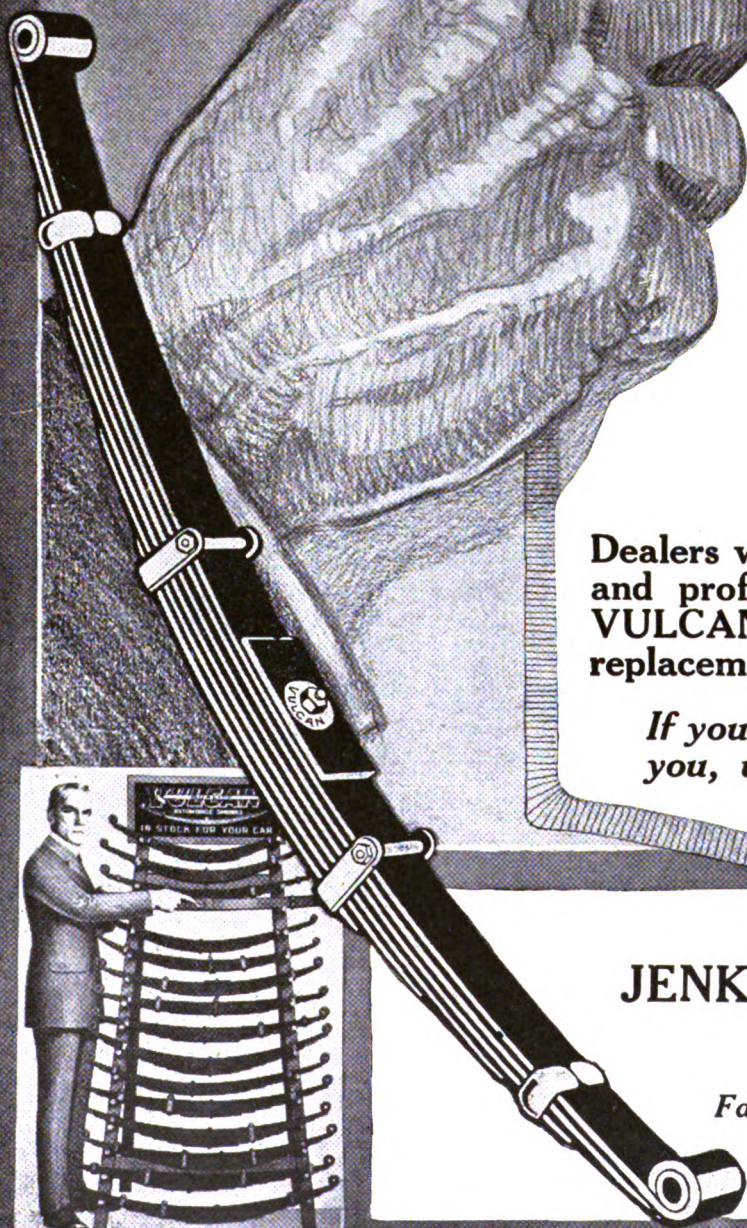
When the company learned the results they had obtained in one year under adverse circumstances, they built, according to the Roots' plans, this fine new station with four pumps, a neat little office connected with the garage in which are housed the four delivery trucks now needed, as well as a touring car. Four men employed by the Roots are constantly busy delivering oil to the 22 country and village stations in their territory of a little over a county.



# When Springs Break, put on

## **VULCAN**

QUALITY  
The Replacement Spring



**The VULCAN**  
name plate stands  
for the best that can  
be built into springs.  
We are suggesting to  
millions of car owners,  
through such mediums  
as the Saturday Evening Post,  
and other national publica-  
tions, that they look for this  
name plate.

Dealers who desire quality, service  
and profit should insist upon our  
**VULCAN** name plate on every  
replacement spring.

*If your jobber cannot supply  
you, write us—today.*

### JENKINS VULCAN SPRING COMPANY

Factory, Richmond, Indiana



# Readers' Questions and Answers

## Dry Cell Battery Construction.

I should like to see an illustration of the internal construction of a dry cell battery. Can you find space in your columns for this? Also can you tell me what part of such a cell is the first to wear out? Is it practical to repair dry cells?—H. D., Ill.

The illustration you request appears on this page.

Dry cells are so designed that all the elements waste themselves in approximately the same period. These elements are usually combined in such proportions that about the time the electrolyte is exhausted, the zinc can will also have outlived its usefulness. It is decidedly not feasible to repair dry cell batteries. It is much cheaper to replace them with new ones than to attempt to rehabilitate those that have been exhausted.

\* \* \*

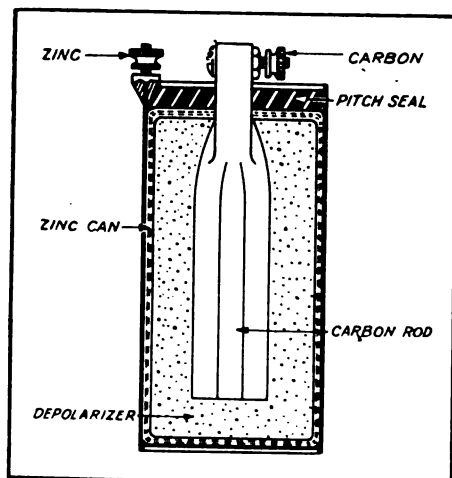
## Regulating Bosch Magneto.

How do you change a Bosch magneto that runs to the right to make it run in the opposite way or to the left? Should a magneto that is put together right generate current either way it runs?

If the turning way of a magneto is arrowed to the right and the magneto is put on a car without changing to the left, will the magneto short out in time?—R M., Iowa.

The rotation on the different types of all magnetos may be changed as follows: The DU and ZR type may be changed by using a clockwise or anti-clockwise breaker corresponding with the direction in which the magneto travels, changing stop screw and end plate so as to have housing rotate, cams to come in contact with the interrupter lever at correct time, namely, approximately 10 mm. past dead center. Gears on distributor plate are to be changed accordingly, so as to make markings on gears correspond.

On the NU type, it is only necessary to



Internal Construction of Dry Cell Battery.

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

change the interrupter to the rotation desired as well as the interrupter housing, the same as described in the preceding paragraph.

Bosch magnetos generate currents traveling in either direction, but cannot be used efficiently without the changes for the different rotations mentioned. If the interrupter is of clockwise rotation, a spark cannot be obtained if run in the anti-clockwise rotation, inasmuch as the timing of the gears and breaking point of the platinum points are out of time.

\* \* \*

## Truck Troubles.

Is there a brake on the Borg & Beck clutch on a one-ton All-American truck and is there any way of stopping the gears while shifting to keep them from wiping? There is also a knock in the engine which sounds like the mains, but all bearings have been taken up, flywheel tightened, carbon removed and it still knocks. Where is it likely to be?—C. H. T., Ill.

Not all Model A All-American trucks are equipped with a brake on the Borg & Beck clutch. It is possible, however, to install this brake on any of the Model A trucks which would stop the gears when disengaging the clutch so that the gears could be meshed with less effort and damage.

In reference to the knock in the engine, it is rather hard to tell just where to look for it, as it is not fully described. It may be due to loose-fitting pistons or piston pins. It may also be due to high compression or end lash of a crankshaft or camshaft. If the knock is caused by end lash of the crankshaft, it will be necessary to

replace the main bearing bushings. If it is caused by the camshaft, it can be remedied by adjusting the screw which is located on the front side of the timing gear case.

The earlier Model A trucks were not equipped with the Manuel spark advance and the knock may be due to the magneto being timed too fast.

If you will give us a more complete description of the knock, we may be able to locate it definitely.

\* \* \*

## Defective Cell.

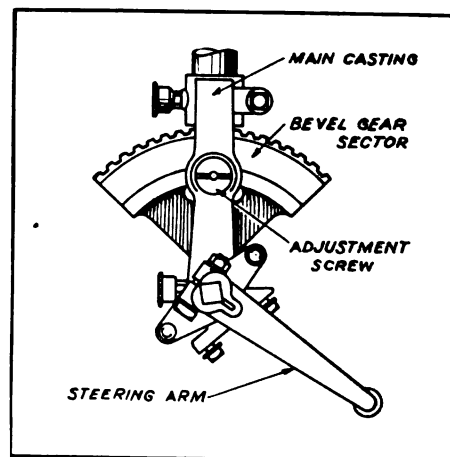
Would it be possible for a storage battery to fail if only one cell was out of order?—E. V., Mich.

If one cell is completely dry, it may cause an open circuit and the whole battery will fail. This trouble may be due to a broken jar.

\* \* \*

## Steering Gear Troubles.

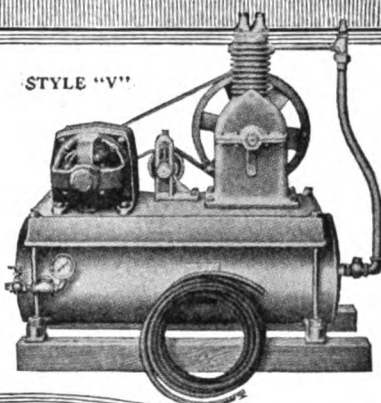
Among the repair jobs brought into our service station was a Reo with a bevel gear and sector steering gear. Kindly advise us how to eliminate back lash or lost motion in it.—B. W. M., Wisconsin.



Showing Steering Gear Adjustments.

Unless it is due to depreciation of the plain bearings supporting the steering post and steering shaft, this back lash or lost motion can be compensated for by screwing in on the adjustment screw which carries a roll at its lower end, bearing against the back of the bevel gear sector. By this adjustment, good contact is assured between the pinion and sector teeth, thereby eliminating lost motion.

Depreciation of the plain bearings may be avoided if sufficient quantities of grease are kept on the bearing. The plain bearings of nearly every steering gear, in fact, may be lubricated through the medium of compression grease cups. See the accompanying sketch.



STYLE "V"

# THIS SIGN

Displayed by progressive garages and service stations will bring you new customers and hold old ones. It stands for pure, clean air, free from oil. Motorists know that oil-soaked air ruins tires, and are on the lookout for this sign. When you furnish Curtis Air you give *real* service.

# CURTIS AIR

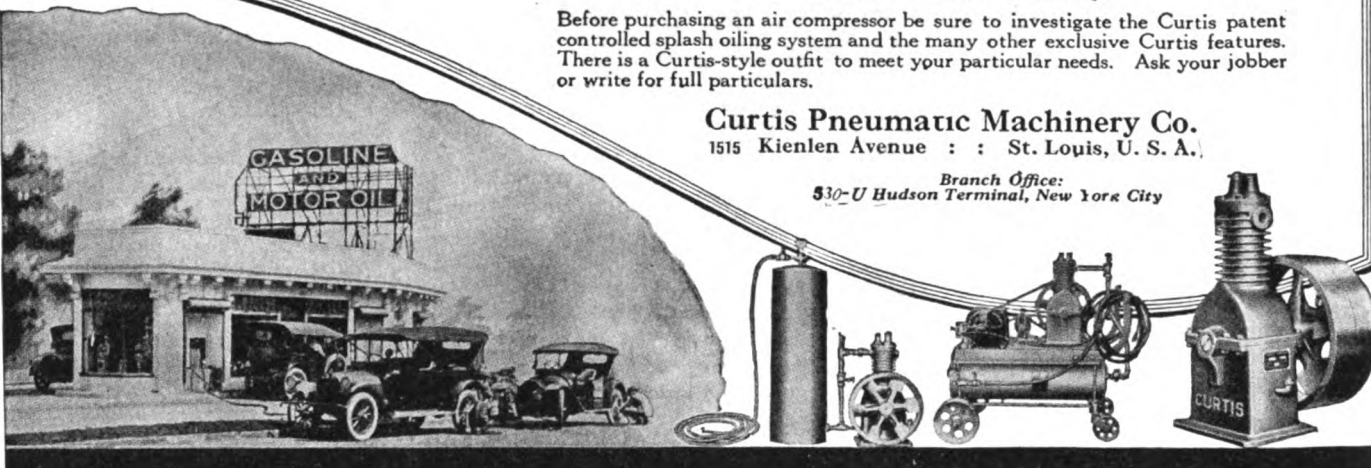
## FREE FROM OIL

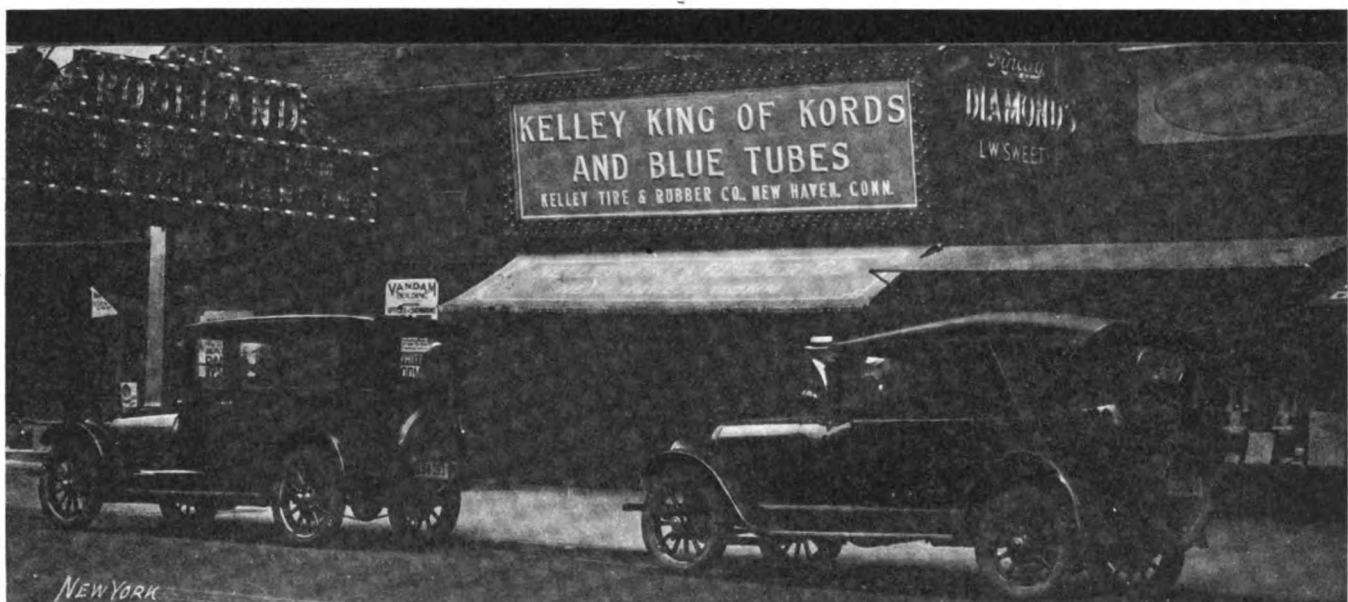
Before purchasing an air compressor be sure to investigate the Curtis patent controlled splash oiling system and the many other exclusive Curtis features. There is a Curtis-style outfit to meet your particular needs. Ask your jobber or write for full particulars.

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Let us send you a sketch showing how *your* Oplex Sign will look.

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Pacific Coast Distributors  
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**ELECTRICAL ADVERTISING**  
Niagara St. & Potomac Ave., Buffalo  
Canadian Factory  
**THE FLEXLUME SIGN CO., Ltd.**  
Toronto, Ont.

### Weak Spark.

THE AMERICAN GARAGE & AUTO DEALER has given me many valuable hints in the past and I hope it can answer this question. I own a Buick light six which I have driven four years. Of late I have been unable to make cylinder No. 6 fire regularly. I have just had the carbon burnt out, valves ground and fresh oil put in the crankcase; the plug is new and I can think of no other adjustments to make—yet No. 6 continues to fire irregularly. Can you suggest any other means of locating the trouble?—H. N. K., Ill.

The irregular firing of cylinder No. 6 is undoubtedly due to a weak spark. This can be caused by four things: A weak battery, faulty contact in the distributor, a faulty plug, or a rotten cable. In your case, the trouble probably lies in the last-mentioned item, a rotten cable.

Very often oil eats up the rubber insulation of the cable and allows the spark to leak away. Again heat may bake the rubber insulation so hard that it cracks and through these openings the spark may jump to ground.

\* \* \*

### Chattering Reamer.

I am doing quite a little reamer work in my repair shop. Please tell me how I can stop my reamer from chattering.—H. M., Ia.

There is always a tendency toward chattering if the reamer is not well sharpened; this is attended by a consequent production of a rough surface.

Chattering can be prevented by separat-

ing the cutting edges by irregular spaces. With machine reamers, the use of the spiral flutes almost invariably eliminates chattering.

\* \* \*

### Paper Gaskets.

Is it good practice to install paper gaskets or liners under cylinders next to the crankcase?—K. T., Nebr.

The application of paper gaskets is permissible if one side is coated with grease or shellac. Very thin paper liners are in general use. If thick or soft, they would not hold where high pressure is produced, because soft gaskets would likely give or loosen.

\* \* \*

### Repairing Cracked Water Jacket.

What method do you recommend for repairing a cracked water jacket. I am a garage owner and conduct a repair shop. We are on a repair job now which consists of a broken water jacket, the crack being of some length—about two inches long.

I would like to have this information as soon as possible. Let me say that I derive a great deal of benefit from reading your magazine.—R. J. H., Wis.

To prevent further extension of the weakness in the water jacket, a small hole should be drilled and tapped at each end of the crack; screw in an iron stud. Next, clean the outside and inside of the fracture thoroughly, using a scraper and gasolene. The crack is now ready for the soft copper filings or granulated glass spelter; accordingly heap the filings over the crack

and apply a blowtorch, directing the flame on the filings.

Be sure that a fair amount of metal has been worked into the opening and then cool the metal. Finally the iron stud should be cut off flush with the jacket surface and the copper filed smooth. It is a certainty that no further break will ever appear at the spot just repaired—it will endure the life of the motor.

\* \* \*

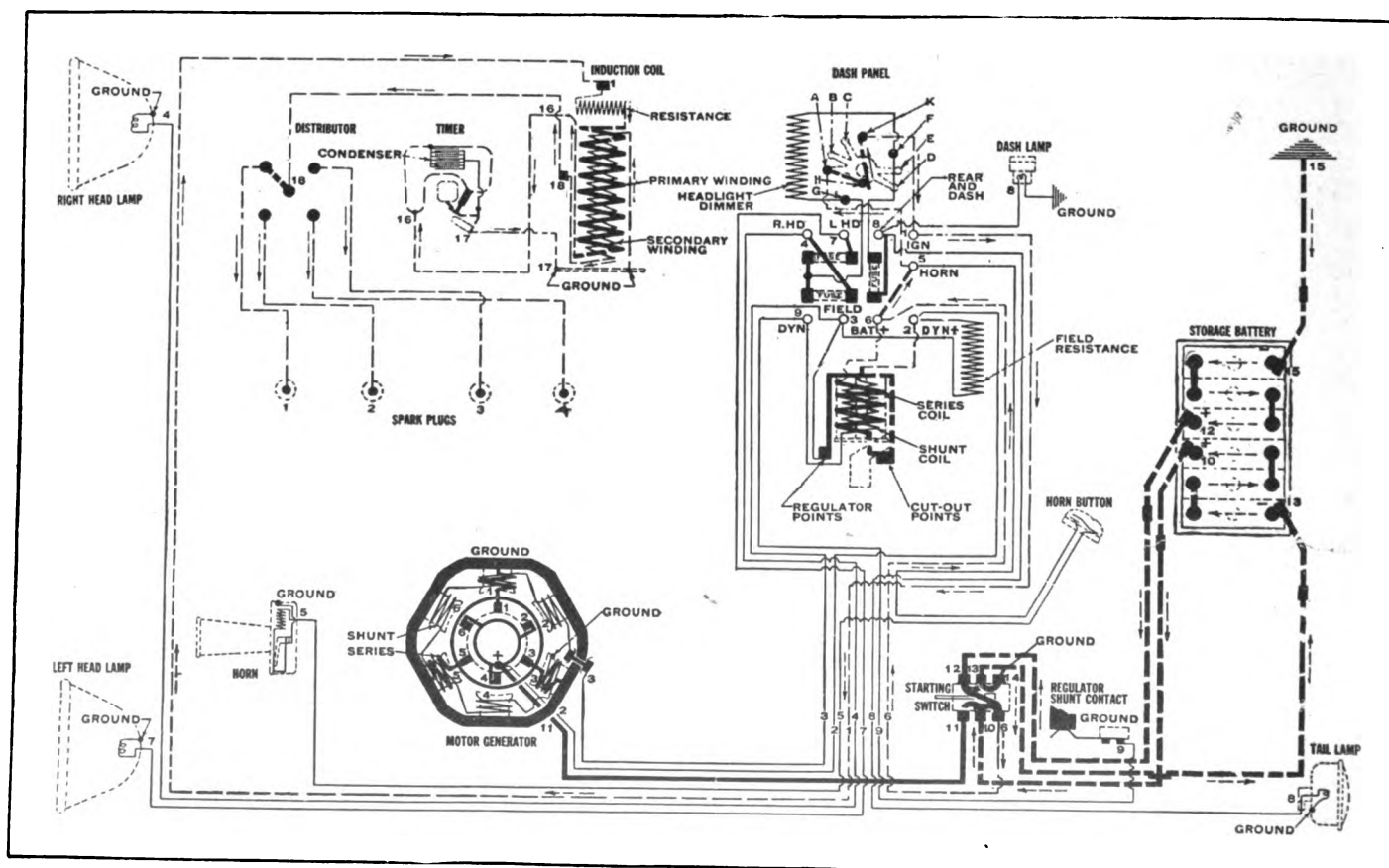
### Maxwell Data.

Will you please publish the Maxwell wiring diagram and answer the following questions?

1. How often should the clutch be oiled on a Maxwell?
2. How much does this car weigh?
3. What is the S. A. E. rating?
4. What is the B. H. P.?
5. Is the S. A. E. rating the same as the N. A. C. C.?—J. H., N. Y.

The wiring diagram you ask for will be found on one of the pages of this department.

1. The clutch should be oiled about every 500 miles with one-half pint of engine oil through hand hole or plug hole in left engine support arm.
2. The weight is 2,100 pounds.
3. The S. A. E. rating is 21.03.
4. Same as the rating horsepower. This is the calculated B. H. P.
5. The S. A. E. rating is the same as the N. A. C. C.



The Wiring Diagram of the Maxwell—The Ignition Circuit is Indicated by the Line of Dashes and Arrows.



# *Don't Let Business Get By Your*



Business will **pass you by** if your garage does not stand out from others—if it is not easy to find at night time as well as day. Take that step from obscurity to the limelight—attract attention in a positive and dignified way—by installing a beautiful porcelain enameled steel—

## **FEDERAL Electric Sign**

It is so constructed that it will not rust, rot or decay. The maintenance expense is practically nothing—only a few cents cost per day for electricity. Never needs to be painted or refinished—an occasional washing makes it like new. It's the 24-hour a day salesman that pays for itself many times over.

## **9 Months To Pay**

The first payment brings you the new worker which toils tirelessly day and night. Increased business which it will obtain, will more than pay the remaining monthly payments. Send the coupon today for full information. No obligation.

## **FEDERAL ELECTRIC COMPANY**

**8700 South State Street, Chicago**

**91 New Montgomery Street  
San Francisco**

**627-649 W. 43rd Street  
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**Branches in all large cities**

### **Federal Electric Company, 8700 South State Street, Chicago**

Please send full information on Enameled Steel Sign for my business and your 9-months-to-pay plan. No obligation.

NAME .....

ADDRESS .....

BUSINESS .....

AGAD-9

### Soldering Notes for Repairmen.

(Concluded from page 27.)

conductors used about automobiles, tractors, and trucks, can be formed in the manner described.

The "sweating" process, as it is called, is much used in soft as well as hard solderings. Should it be necessary to place a patch on the radiator tank, a much better job can be done with the sweating process than can be done the ordinary way of running the seams as shown at *A*, Fig. 5. Note that the seam extends around the patch, holding it to the tank proper at this point only.

#### Uniting Metals by Sweating Process.

The water in the tank can pass between the patch and tank up to the seam; therefore, it will be readily seen that a very light twist or jar can cause the joint to be broken, resulting in a leak from under the patch. Now, should we use the method known as the "sweating" process in a patch of this kind, it will be much stronger than any part of the tank and outlast the remaining portion of the tank.

Referring to Fig. 6 at *A*, we have an irregular fracture in the tank to be repaired. The first step will be to procure a piece of metal sufficiently large to cover the fracture as shown by dotted line *B*. All surface inside this dotted line should be thoroughly cleaned of all foreign substance until the metal is bright, after which the soldering flux should be applied.

With the torch, heat the surface and at the same time apply a little wire solder. Continue the heat until the solder flows freely over the entire surface that has been prepared. Prepare the patch in the same manner and give it a coat of solder and the sweating process can be used for finishing the work.

Take some sort of a tool such as an old file or screw-driver as shown at *B*, Fig. 7, and press the patch firmly down to place, immediately applying the heat to the patch with torch *C*. The heat will melt the solder on both tank *A* and patch *D*, that has previously been placed and the slight pressure on tool *B* will cause the patch to settle close upon *A*, while the solder will ooze out at the edges.

Now that the solder is well melted, turn out the torch, but continue to hold tool *B* steadily in position until the solder "sets" sufficiently to hold the patch in place. Clean the surface along the edge of the patch and apply a little flux. Take the soldering bit, or copper as some prefer to term it, and run the seam and the job is finished. A patch placed in this manner will outwear the tank if properly put on.

This sweating process can be used in many cases to a good advantage such, for example, as illustrated in Fig. 8, which shows a copper tube to which it is desired to connect the one-half of a union attached to either the gasoline tank or the carbureter. At *A* is the copper tube and at

*B* the female half of the union to be attached. Heat the end of the tube *A* slightly a little farther back than it will extend into *B* and, while hot, dip the end into the flux. This will remove the coating of foreign substance on it and it will take solder readily.

Apply the heat again and at the same time touch it with the wire solder when the solder will flow quickly and evenly over the surface that has been fluxed. Now, flux the inside surface *B*, and apply the heat until it spreads evenly over the inner walls. We are now ready to unite the two pieces that have been prepared.

Play the flame onto both the tube and the union until the solder flows freely on both. With a small pair of pliers quickly slip *B* over *A* and continue the heat for an instant or until the solder oozes out at *C*, when the heat can be turned away and the work cooled. Remove any bunches of solder that might be sticking outside that will interfere with the action of the union nut and the job is ready to install.

These are only a couple of jobs that can be handled with the torch and sweating process. There is no limit as to what can be done along this line—in fact, if we were to try to enumerate all of them and describe the method of procedure as we have done in the preceding paragraphs, we could fill the pages of a large book and still not be well started.

Soldering, like everything else in the repair field, requires much thought and special preparation for the different pieces of work that comes to the shop. The jeweler may do 100 different pieces of work in a day and every one of them be a little different than the other—it's the same way with soldering in the repair shop. Learn the why and wherefore of the solder and soldering tools from the angle of practical application—and all jobs are easily handled and results are certain.

We might liken the art of soldering to "the old swimming hole down in the woods by the bluff." If we can swim in the little pond, we can swim just as well in the ocean—if we just think we can. If we can successfully solder a hole in a tomato can, we can successfully solder a new tank onto the radiator.

### Welding, Cutting and Brazing.

(Concluded from page 29.)

wise or so placed on the welding table that it cannot roll about.

When the burned metal is removed, the cavity is filled in much the same manner as when filling a groove or worn spot. The bottom of the cavity is filled first. Then the filler is gradually built up until the stem is round with surplus filler.

Small pits in the valve stems or heads are filled in the same way as the larger burned portions, first melting and scraping them, and then adding a drop of filler to each cleaned pit. Where several pits

are located close together, it is probably better to weld them into one, as it is easier to make a solid weld that way. If the pits are located on the ground portion of the seat, or are rather deep, the welder will need to be quite skillful in torch operating, or he will completely ruin the valve.

When welding on a new stem where the old one is cut off close to the head, the operator will, no doubt, find it better to place the head flat upon the table and weld the stem in a vertical position, or at least keep it in that position until the two are firmly connected.

No preparation is made for welding on the head portion except to clean it of all dirt or carbon. The stem part is prepared the same as in the other method. The end is cut to a long wedge to insure a strong bond when the weld is finished.

The preceding discussion coupled with the accompanying drawings should now enable the average welder to work out the repairing of any kind of valve that is adaptable to the welding process. Valves having defects not mentioned here, may be handled similarly if a little thought is given the matter.

### Auspicious Garage Housewarming Attracts Many Visitors.

Transforming his garage into a bower of bunting and flowers, C. O. Farnham, of Paris, Ill., gave a housewarming recently in his new \$50,000 establishment.

On the night of the opening some 1,500 people called during the entertainment, which was devoted to speaking, music and dancing.

Contrary to the expressions of most property owners, in the semi-residential section in which Mr. Farnham's garage is situated, the "neighbors" expressed themselves as being "proud" of the "place next door."

The building of the Paris Auto Co., as the establishment is called, is strictly modern and fireproof. It contains 15,000 square feet of floor space. The exterior of red tapestry brick with stone trimmings is exceedingly attractive.

On the first floor in the left wing is the company's office, a spacious room, well lighted. Walls and ceilings are cream tinted. An immense oak parts cabinet fills one side of the room. The other side looks out in the center clearway where the cars are housed. A ladies' rest room with wicker furnishings opens off the office. In the left wing of the building is a showroom where Haynes, Paige, Chandler and Cleveland models are on display.

Between the office and showroom is a driveway leading into the great storage room which occupies the rear of the building. The storage room is lighted by 12 skylights. On the first floor also are the vulcanizing department, storage battery and automobile laundry department.

On the second floor is the repair shop.



## *More Service from Tires— and More Profits for Dealers*

The most progressive and farsighted tire manufacturers have struck a new note in their merchandising policies.

They are no longer content merely to make and sell tires. They are equally interested in seeing to it that car drivers get **more service** from their tires.

They tell how to take care of tires—

- the importance of keeping them properly inflated
- the damage due to skidding around the corner or stopping too suddenly
- the wisdom of keeping wheels in alignment
- the necessity of having worn places promptly vulcanized—

and so through a whole list of things to do and not to do.

### **THE COFFIELD TIRE PROTECTOR**

is just another medium to enable drivers to get **more service** from their tires.

It backs up the casing and reinforces it against blowouts and practically eliminates punctures. It is made of pure live rubber, **without fabric**, and, therefore, cannot heat and chafe. It doubles the normal mileage of the tire.

Your trade is interested in any commodity that will do all these things. They are looking for it and are ready to buy it.

They are being influenced by this "more tire service" propaganda. Take advantage of this trend and offer them something they so much desire. You thereby increase your profits and build up your business.

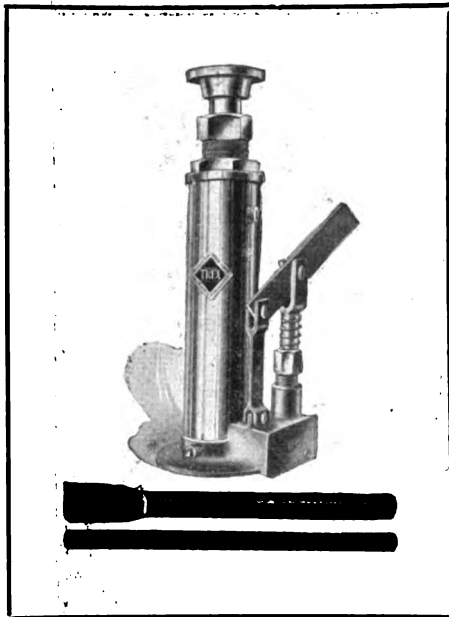
*Somebody is going to sell Coffields in your section. Why not you?  
Let us tell you what a splendid proposition for dealers we have to offer.*

## **The Coffield Tire Protector Co., Dayton, O.**

# Accessories—Dealers' Key to Profits

## Unique Hydraulic Jack for Passenger Cars and Trucks.

As a little brother of the enormously powerful hydraulic jacks used in lifting ponderous machinery and monstrous loads in construction and building work, the Trexler company is presenting its new hydraulic jack for passenger cars and trucks.



Simple and Convenient Trex Hydraulic Jack.

To raise a car, the jack is simply placed in position and the handle worked up and down like a pump. To lower the car, the same handle is pushed down with the hand or foot as far as it will go, and it comes down easily, the manufacturer says, just like a barber's chair.

When the device is free from the car, there are no Chinese puzzles to fuss with in collapsing or opening it. It is not subject to damage when placed in the tool box, says the manufacturer, and besides it takes very little room.

The Trex hydraulic jack is finished in bronze and battleship gray. That there are no gears to slip and no ratchets to catch are further claims to be noted.

Write to the Trexler Co., 1418 Walnut St., Philadelphia, for complete details concerning this new device and mention the American Garage & Auto Dealer.

## New Radiator Solution Tester Which Prevents Freezing.

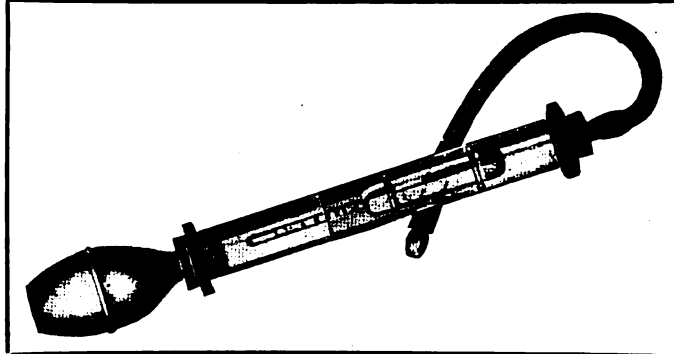
Of interest to every accessory dealer, car and truck owner is the announcement of the Beckley-Ralston Co. regarding the Radiatometer, a newly-perfected instrument for testing radiator solutions.

Frozen radiators have always been a

source of annoyance and expense. For years some means of preventing radiators from freezing has been constantly sought for, but it has remained for the Beckley-Ralston Co. to arrive at the solution of the difficulty.

The instrument as shown in the accompanying illustration is extremely simple and

The Radiatometer  
Has Been Re-  
cently Perfected  
for Testing Ra-  
diator Solutions.



accurate. It works on exactly the same principle as the well-known Master hydrometer made by the same company. A long, flexible rubber tube allows easy access to the radiator solution. A graduated chart on the float tells instantly the strength of solution necessary to withstand varying degrees of temperature. It is then an easy matter to pour in enough alcohol to withstand freezing even in the most severe weather.

The Radiatometer, being a necessity to every owner of a water-cooled motor car, truck and tractor, will undoubtedly prove a strong winter seller for dealers. The Beckley-Ralston Co. is introducing an innovation in supplying it put up in handsome holly boxes for the Christmas trade. Every owner can use some accessory and a Radiatometer makes an extremely practical gift that will be appreciated.

The Beckley-Ralston Co. is manufacturing them in considerable quantities and dealers are already being supplied for early winter trade. For further particulars write to the Beckley-Ralston Co., 1801 Michigan Ave., Chicago. Mention the American Garage & Auto Dealer when writing.

## The Theftproof Auto Lock Now Member of Simplex Line.

The makers of the Simplex steering wheel lock for the Ford, Dodge, Overland 4 and Chevrolet "490" have taken over the Theftproof auto lock formerly manufactured by the Hershey Mfg. Co., Denver, Colo.

The Simplex Corp. now has a complete line of locks for practically all cars. The theftproof lock attaches permanently to the

steering column a few inches beneath the wheel. It is a neat ring in appearance. When locked, a case-hardened steel pin passes through the outside steering column into the tube. Wheels are locked in straight-ahead position so that the car cannot be driven or towed.

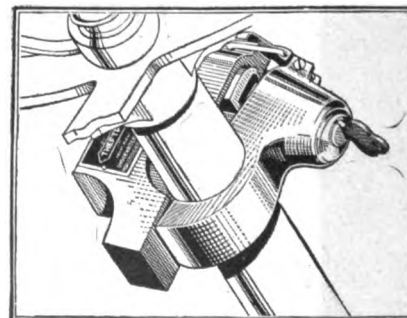
Installation is made without removing

the steering column or interfering with mechanism inside the steering column. The Corbin lock is used. The manufacturers state that the Simplex auto lock has the approval of the Underwriters' Laboratories, carrying a 15 per cent reduction in insurance premiums.

For more complete details concerning this theftproof lock, write to the Simplex Corp., 2214 S. Michigan Ave., Chicago. Mention the American Garage & Auto Dealer when writing for more complete details.

## Becker Bros. Brushes to Bear Stamp and Code Number.

Although Becker Bros., of Chicago, have been in the brush-manufacturing business for 27 years, their brush business in the

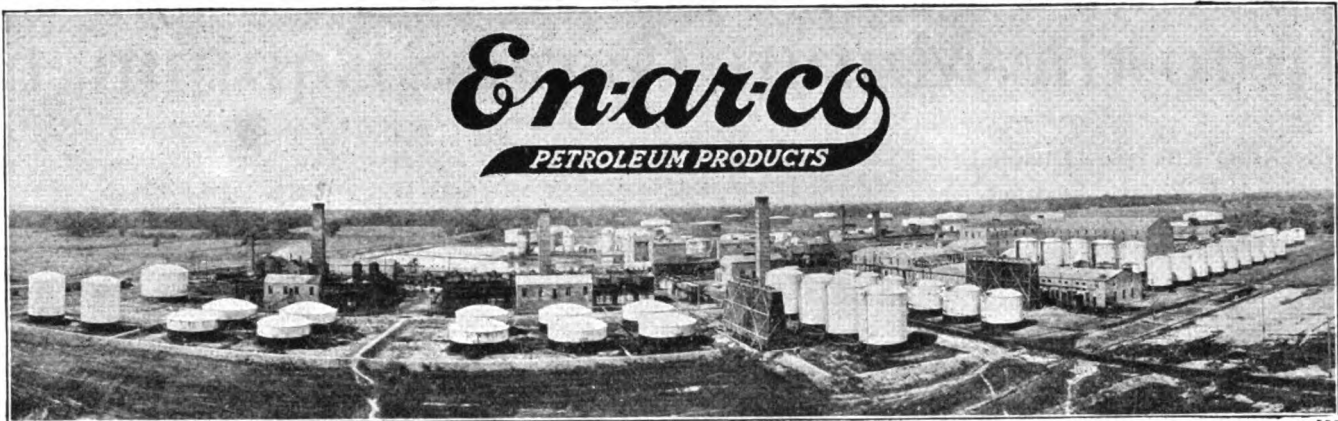


"Theftproof" Is Neat Ring In Appearance.

past five years is said to have increased 700 per cent.

Henceforth, all brushes for use on starting motors and lighting generators for automobiles manufactured by Becker Bros. will bear the stamp "B. B." as well as the code number.





## The Oil of a Million Tests

The secret of successful scientific oil refining is painstaking care and ceaseless vigilance. In making EN-AR-CO oils we average over a million tests a year. It is only by this multiplying of tests that perfect products can be made. This thoroughness in our scientific refining processes is the protection we offer to users of our products.

### A new advertising idea that proves the quality of EN-AR-CO products

The above quotation is the introduction to our new advertising campaign.

It is used to establish the care, the thoroughness and the scientific accuracy with which EN-AR-CO oils are produced.

The figures "a million tests" are actually conservative, large as they may seem. For testing actually begins with the crude oil at the wells before we start to refine.

Refinery and laboratory tests are then carried through practically each hour of the 23 days necessary to completing refining

processes. The last test is made before putting oil in the packages which are shipped to dealers.

Only in this way can absolutely dependable quality be obtained. Only by this multiplying of tests can oils be produced that are absolutely true to type and specifications.

EN-AR-CO motor oils and gear greases, White Rose Gasoline and National Light Oil never vary from their high quality because of these tests.

### Write us today for dealer advertising plans

Dealers should write to us at once for our special proposition and for particulars of our dealer co-operation plan of advertising which has proved exceptionally successful in creating business. The dealer's success is based on the quality of the goods he sells. EN-AR-CO products, which give full consumer satisfaction, are business builders.

**THE NATIONAL REFINING COMPANY**  
2147 Rose Building Cleveland, Ohio

THE NATIONAL  
REFINING  
COMPANY  
2147 Rose Building  
Cleveland, Ohio

Please send me particulars about your plan for EN-AR-CO dealers and other information about your products.

Name .....

Address .....

City .....

I now handle .....

# Up-to-the-Minute Garage Equipment

## Unparalleled Efficiency Claimed for New F-F Rotary Rectifier.

The pocketbook of the battery man is affected for better or worse largely by the reliability, upkeep, and efficiency of his charging set. His profits depend upon getting the right equipment.

To make it possible for the charging station to realize greater profits, the France Mfg. Co. is introducing to the trade its F-F rotary rectifier.

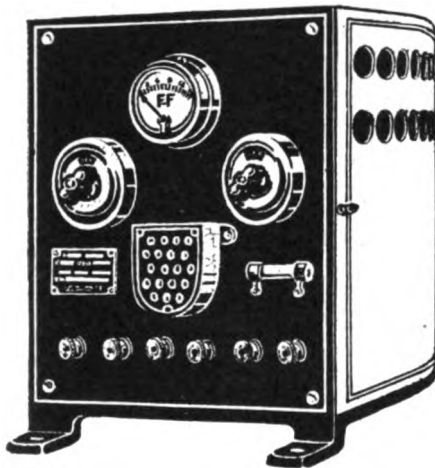
The F-F rotary rectifier is the outgrowth of the well-known small F-F magnetic rec-

so that the batteries would be charged in the reverse direction.

The voltage and current regulator is adjustable to any number of batteries and the current may be set at any desired value and raised or lowered gradually, regardless of the number of batteries connected to the circuit for charging.

The F-F rotary rectifier is said to be easily installed, and its workmanship and performance are fully guaranteed by the manufacturer.

Write to the France Mfg. Co., Berea Rd. and West 104th St., Cleveland, Ohio, for trade prices and further particulars. Mention the American Garage & Auto Dealer when writing.



The Simple and Rugged F-F Device.

tifier for individual use and is designed to meet the need for a simple, rugged charging device of large capacity with variable current control characteristics.

The line current is simply rectified and the drop in voltage from rectification is so little that up to 14 batteries, or 42 cells, can be charged in series at one time from a single-phase 115-volt alternating current circuit.

The alternating current is passed through a revolving switch mounted on ball bearings, which serves to reverse the direction of the negative alternations so that they flow in the same direction as the positive alternations, producing what is known as a full-wave, pulsating, charging current. It is owing to this fact that all the current is delivered to the battery.

There is no danger in night charging, the manufacturers claim. If for any reason the alternating current supply fails, as not infrequently happens in commercial service, the rectifier simply stops and open-circuits the batteries. It is impossible for the battery to discharge back through the apparatus.

When the line current is re-established, the rectifier picks up its load automatically and continues to charge at the same rate as when it stopped. There is no possibility of the polarity of the rectifier reversing

## The Heiser Cylinder Reboring Machine Is a Business Builder.

A money maker, fast and accurate, and easy to operate are some of the claims made for the Heiser cylinder reboring machine for Ford motors.

Among the special features of the Heiser are these:

It is self-centering, from both ends of the cylinder.

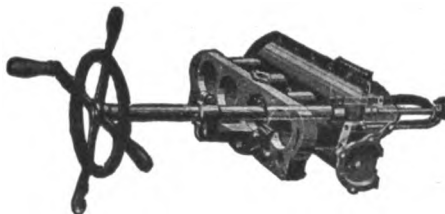
It rebores between centers which insures a finished cylinder that is round, straight and true.

It is adjustable and the only machine on the market, the manufacturer says, that will rebores the cylinder for different size pistons without a micrometer measurement.

It is self-sharpening—it does not have to be returned to the factory to be re-ground.

With a Heiser, it is stated that the repairman can accurately rebores all four cylinders in one hour's time.

Each machine is equipped with two cutting tools. These are of special design and made from the best quality high-speed steel; they are self-sharpening and need



The Heiser Rebores Four Cylinders an Hour.

no grinding. The machine is said to be so rigidly and accurately built that chattering is impossible. The cutting tool overlaps itself on each revolution and leaves a perfect finish.

The Heiser is guaranteed by the manufacturers to leave the finished cylinder

square with the crankshaft, round, straight, true, and free from taper.

For more detailed information, write to the Heiser Special Tool Co., Kansas City, Mo. Mention the American Garage & Auto Dealer when writing.

## New Time Recorder That Will Prove Efficient Business Asset.

There is really no limit to the uses to which a time stamp can be put in the garage, in the shop, and in the office.

These devices can be used to record the



A Time Recorder Has Innumerable Uses.

time the employes arrive in the morning and the actual time they leave in the evening; they record the actual time all correspondence is received; the time it is answered; the time each job is started; the time it is finished—in fact, the time stamp has a thousand and one uses.

The Henry Kastens Co. is manufacturing time recorders in several different models and styles. Each model is made, it is claimed, to the most accurate degree of perfection, is scientifically machined, attractively finished, and bears the company's guarantee.

Write to the Henry Kastens Co., 418-420 W. 27th St., New York City, for further particulars, and don't forget to mention the American Garage & Auto Dealer.

## The Ambu Soldering Iron Ready to Use and on the Job.

There is a real pleasure in work well done. The American Bureau of Engineering, Inc., claims that the Ambu soldering iron, which it is manufacturing, will not only be a time and labor saver, but will assist the garage-man and repairman to make business a big success.

The Ambu solder iron complete consists of three feet of rubber-covered braided

# *Make Him Think of Oil!*



This, our "make-it-pay," portable, Utility Model air compressor outfit, removes the last, lingering excuse of the man who protests that it is an expense to give free air.

A silent salesman for the suburban garage and for the service station upon much frequented motor highways.

Good will plus profit—an unbeatable combination as an investment. Makes two oil sales where but one existed before.

Ready for service to you and your customer.

We deal through exclusive distributors only. Some unclosed territory is still open for desirable distributors.

*Write for  
Catalogue*

## **GENERAL UTILITY COMPANY**

**1324 Ogden St. Philadelphia Pa.**

*Utilities that Sell Because They Serve*

Export Department: 17 Battery Place, New York, N. Y.

Western Sales Representatives: JOHN M. STOCKFISH CO., 111 Washington St., Chicago, Illinois

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers

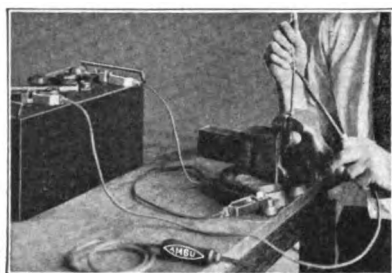
wire with a clamp for attaching to the battery, a three-foot connecting wire with two clamps, six carbon points, a piece of wire solder and one 2-ounce can of Ambu soldering paste.

The iron works wherever there is a storage battery, whether in the shop, on the car, or in the garage. The carbon tip of the iron completes the battery circuit when it touches the piece to be soldered. Isn't it simple?

The accompanying illustration shows how to put a test point handle on a wire. Note the manner in which the battery circuit is completed by the carbon tip of the iron where the heat is needed. One terminal of the battery is connected to the vise. The connection on the iron goes to the other terminal.

Application of heat on the outside of the  $\frac{3}{4}$ -inch rod is sufficient to flow solder into the hole in the end of the rod. Note the coiled wire laying on the table with the test handle on it. When the rod is full of hot solder, the end of the wire is plunged into it, held steady and then quickly cooled with a wet rag.

The Ambu soldering iron, it is said, wastes no current because none is used except at the instant you begin to solder. The current used in starting once is



Placing a Test Point Handle on a Wire.

enough to make more than eight connections.

For trade prices write to the American Bureau of Engineering, Inc., 1601-3 South Michigan Ave., Chicago. Mention the American Garage & Auto Dealer when writing.

### Rolls-Em-Out Fender Straightener Rolls Dollars Out of Dents.

In a flash you will see the advantages and opportunities offered through the use of the Stiles Rolls-Em-Out fender straightener. With this it is declared that without marring the enamel or finish that is not previously damaged, without removing fenders from a car, dents can be quickly straightened. The old laborious process of hand peening and bumping is entirely done away with, for it is claimed that the surplus metal is distributed uniformly and the fender surface is perfectly and quickly reshaped and smoothed.

The Stiles Mfg. Co., manufacturer of the product, says that anybody can use the device. It does not require a mechanic,

or any previous experience or skill, to operate. Illustrated instructions are furnished with each outfit.

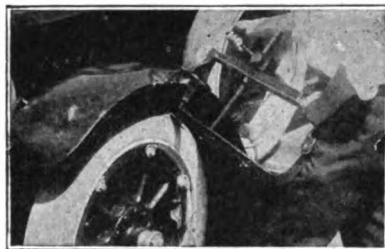
The Rolls-Em-Out fender straightener consists mainly of an adjustable yoke constructed from two malleable iron arms,



The Unsightly Dent in the Fender

hinged and slotted, through which the tension adjustment bar passes. By means of this tension bar the distance or spread between the arms is controlled and operated on the principle of an arbor press.

To the free ends of the arms are fastened, by means of set screws, suitably formed rollers and attachments—the out-

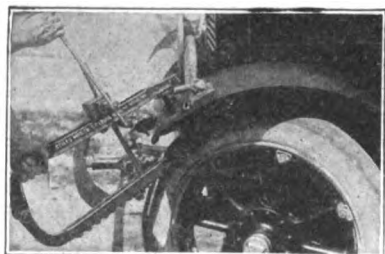


Straddle Block on Concave Side of Dent.

fit including a variety of shapes and sizes of rollers and attachments, each suited to a given purpose. A special attachment is included for rebeading Ford fenders.

In operating, the straddle block arm attachment is so placed over the fender that the concave side of the dent is on the same side as the straddle block. The proper roller attachment is placed on the other arm and, as the tension bar is tightened gradually, the roller is pushed back and forth across the bent place and the dent forced up.

This ironing out process is conducted



Roller is Pushed Back and Forth Over Dent.

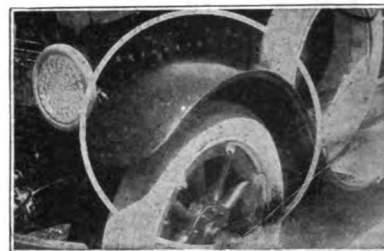
with first one roller and then another until that section of the fender is restored to its original shape.

No matter what type of fender, whether it is flat, oval or fluted, or how badly dented, special shaped straightening tools

included with the set press and roll out the worst abrasions, it is declared.

And not only can fenders be straightened, but doors, bodies, cowls, and hood covers can be repaired as easily as fenders, when damaged parts can be made available for application of the device.

Take a look around your shop or make a list of cars carrying unsightly bends or dents. Here is a real opportunity for you to repair them quickly and efficiently and



Fender After the Dent is Rolled.

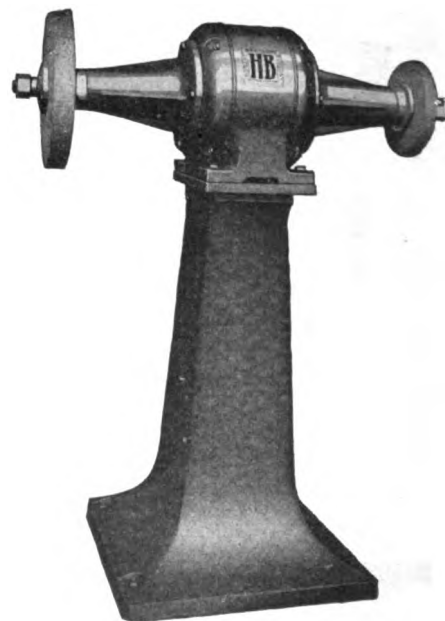
at the same time render a class of service that your customers will appreciate.

Write for further particulars today. Address Stiles Mfg. Co., St. Louis, Mo., and—mention the American Garage & Auto Dealer when writing.

### Hobart Bros. Co.'s Well-Constructed Ball Bearing Motor Grinder.

One of the newest time and labor-saving machines is the Hobart Brothers ball bearing motor grinder, manufactured by Hobart Brothers Co.

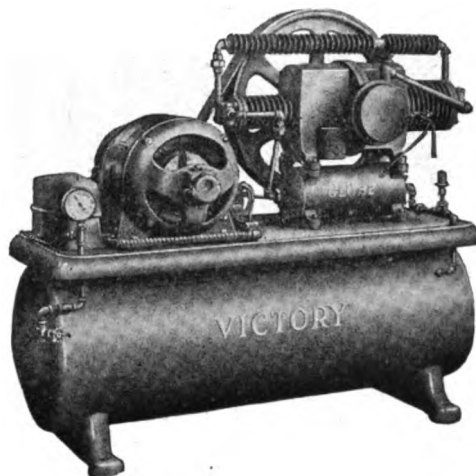
It is equipped with a 2 horsepower quiet running, ball bearing, electric motor



A Motor Grinder is a Labor Saver.

and has ample power for the grinding of castings, sharpening of tools, tire buffing, and many other uses around a garage or machine shop. A buffing wheel or wire brush wheel can be substituted for one of the grinder wheels.





**"VICTORY" Complete Automatic  
Motor Drive Unit**

# **GLOBE AIR SERVICE**

## **your best advertisement**

A first class air service is the most effective and profitable form of advertising that you can use. Any motorist prefers to stop at a garage where his tires are inflated promptly and properly. Your air service is your first point of contact with a large number of car owners. If the service is prompt and dependable, a favorable impression is made—resulting in profitable business.

When you install a GLOBE outfit you are certain of giving an air service which cannot be excelled—and which will prove a big factor in building your business.

The Globe manufacturers made the first two-stage air compressors, setting a standard that has never been equalled.

Globe Air Compressors meet all the requirements of garage service. They provide ample pressure and capacity for inflating the largest pneumatic truck tires. As these tires are daily becoming more numerous, you realize the need of being able to give them service. Globe Air Compressors are noted for their low operating cost and great durability, as well as the dependable service they always render.

*Write Department A-G for Bulletin.*

## **GLOBE MFG. COMPANY**

**Battle Creek, Mich., U. S. A.**

# **GLOBE**

## ***Air Compressors***

The machine is strongly constructed throughout to stand up under the heaviest kind of continuous work. The sturdy base and ball bearings insure freedom from vibration, and only a minimum of power is required to operate the device. Bearings require lubrication only once in every three or four months. There are no belts to fly off and break, says the manufacturer. The weight is 275 lbs.

Further details and trade prices may be had from the manufacturers, Hobart Bros. Co., Troy, Ohio. Don't fail to mention the American Garage & Auto Dealer when writing for this information.

### The Electric Valve Grinder With the Ballistic Movement.

Here's how the Eclipse valve grinder does it—just a little grinding compound spread on the valve, a minute or so of action with the grinder, and both valve-face and seat are said to be smoothed to a clean, hard finish, absolutely gas tight.

The Eclipse is made by the Eclipse Valve Grinder Co., and the manufacturer guarantees that it not only does a much better job than the hand method, but does it much more quickly and at a fraction of the cost. The Eclipse is of attractive appearance, light weight, ample power, simple design, few parts, even balance, and the right shape to be easily handled.

The motor is controlled by a trigger switch in the handle, is well ventilated and operates on either alternating or direct current from 110-volt service sockets. The housing is of a tough aluminum alloy,

treated to insure strength, toughness, and wearing qualities.

The operator merely balances the grinder over the valve. It is not necessary to push down. The lifting spring under the valve head is said to almost balance the weight



The Operator Easily Holds the Conveniently Shaped Grinder in Position.

of the grinder, leaving perhaps a pound of pressure. The operator often reduces even that pressure by lifting a little.

An exclusive feature of the Eclipse valve grinder is the patented ballistic movement which produces a rapid back-and-forward motion in the grinding shaft to do the grinding and at the same time

### Ideal Tire Dressing Tool Distributed By Fairbanks Co.

An ideal tool for dressing tires is the T. & T. tire dresser wheel of the Fairbanks Co. It is said to remove the surplus rubber in the shortest time possible leaving an unusually satisfactory vulcanizing surface on the carcass of the tire after buffing. The cement will grip into this roughened surface and is sure to hold.

Very little power is required to operate the tool and slight physical effort is needed to dress down tires. The distributor guarantees that it will neither grab the fabric nor tear the cords. Removable blades are an exclusive feature. These blades are securely held in place and tested for high speed, but when dull can be removed without the aid of tools and new blades inserted.

All kinds of rough wood work may also be done with this tire dresser wheel. Corners to be rounded or tapered or any odd job of this type found around the shop may be turned out quickly.

The Fairbanks Co., Broome & Lafayette Sts., New York City, will send more complete details concerning this tool. Mention the American Garage & Auto Dealer when writing for this information.

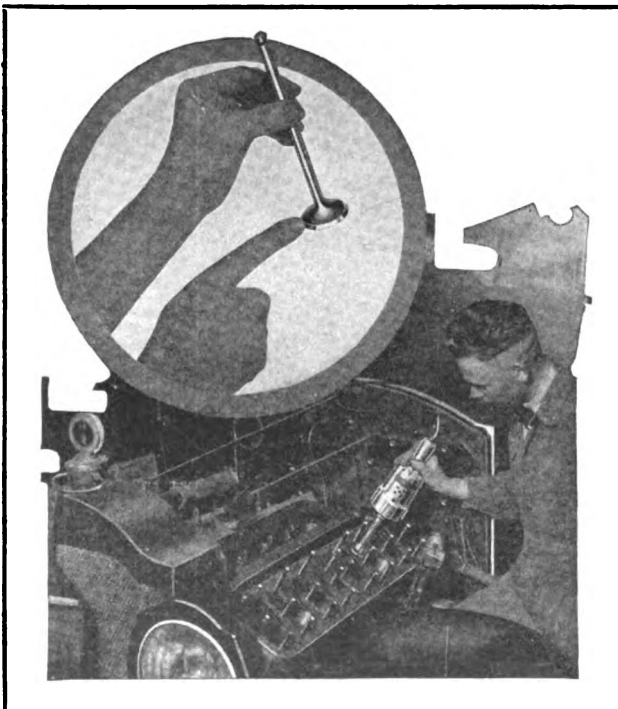
### Portable Test Unit for Electrical Equipment of Cars.

With its Model TF-500 electric portable test unit, designed and built for detecting defects in the electric equipment of motor cars, the Service Products Co. says the service station is able to sell "service" instead of time.

This model consists of a double six-volt battery with special double pole, double-throw switch; a Weston ammeter, double reading, ranging 30-0-30 and 600-0-600; a Weston voltmeter, 0 to 15; single pole, double-throw switch; carrier for motor, generator and tools—all mounted on a rubber tire truck.

The double six-volt battery is said to permit the testing of both six and 12-volt systems, the operating being controlled by a switch mounted on the battery box. The double range ammeter allows full range of meter for testing both motors and generators. The method of testing is extremely simple. Two heavy leads are provided for testing starting motors, two light leads for generator and ignition tests, and one light lead for recording voltage.

By the use of this test unit makeshift methods are said to be eliminated and quick and accurate service assured. The Service Products Co., Springfield, Ohio, will give prices and complete information to those who write to it, mentioning the American Garage & Auto Dealer.



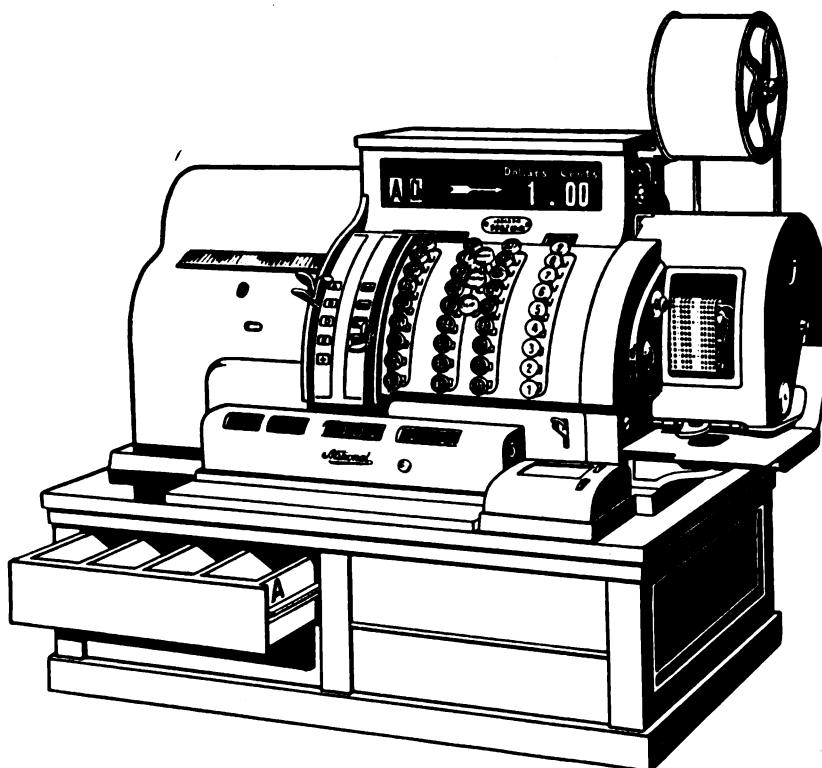
A Little Grinding Compound Spread on Valve, a Minute with the Grinder and Valve Face and Seat Are Smoothed to Clean, Hard Finish.

made in two compartments, effectively separating the grease pocket mechanism from the motor.

Gears, pinions and other moving parts are made of the best steel alloys, heat

a slow rotation to continually move the valve to a new position and insure an equal amount of grinding on every part.

Write to the Eclipse Valve Grinder Co., 20th St. and Oak, Kansas City, Mo.



## This National Cash Register shows

- ① The business handled by each clerk
- ② The business in each department

With this register you know which clerks are the most valuable. You can fix wages on actual selling records.

It gives you printed and added records which you need for a profit-sharing or bonus system. This makes your employees vitally interested in increasing your business.

This register tells which departments of your business are making the most profits.

It tells when a department is not producing as it should. You know when to start a selling campaign to put any department back on a paying basis.

**It is the best way to get the facts you must have  
about your business**

**We make cash registers for every line of business. Priced \$75 and up.**

**NATIONAL**  
**CASH REGISTER CO.**  
DAYTON, OHIO.

# Here and There in the Motor World

## Champion Pneumatic Machinery Co., an Organized Efficiency Unit.

An organization which has learned the power of united effort in the pursuit of its work cannot but succeed in anything which it undertakes.

That is one of the secrets of success of



The Champion's New President is a Thoroughly Practical Automotive Man.

the Champion Pneumatic Machinery Co., manufacturers of Champion air compressors. And in announcing the election of its new president, E. H. Johnson, the company feels that it is not only giving further assurance of its ability to carry on its work as an efficiency unit, but is adding to its organization one whose broad experience in the automotive field insures progressive service.

Mr. Johnson is distinctly an organization man. He is able to take those "little things that count" and combine them into a systematic whole. And in addition to possessing this faculty, the new president of the Champion company is a practical automotive man.

During the past five years, in his association with the automotive world, Mr. Johnson has developed a broad acquaintance and has learned the "game" thoroughly. Mr. Johnson gives as his reason for associating himself with the Champion organization the fact that he has the utmost confidence in Champion products and knows their efficiency.

Although the Champion Pneumatic Machinery Co. has had a recognized financial standing heretofore, it will, with its new connection, have the most substantial resources.

Working in conjunction with Mr. Johnson are Geo. T. Rayfield, who holds the title of vice-president, F. J. Rayfield, secretary, and H. H. Kouka, treasurer and manager of sales. Their capability and experience in the automotive field add to the success of the organization.

In order to care for its ever-increasing business, the Champion Pneumatic Machinery Co. contemplates locating, at the earliest possible moment, in a larger and more commodious factory with a view to trebling production. The present address of the company is 1402 S. Michigan Ave., Chicago.

The Champion line of air compressors is a standardized line. Eight styles of Champion air compressors are now being made. The single and two-stage machines being produced are, it is said, exclusive in the air compressor field. The capacity of these compressors range from  $2\frac{1}{2}$  to 10 cubic feet per minute.

One of the unique mechanical features of the Champion compressor is the mushroom type valves. These are of large area, housed in bronze cages, with a special arrangement for regrinding. They are said to entirely eliminate the springs, brass seats and ball checks commonly used.

For a concern which has been in business but a few years, the Champion Pneumatic Machinery Co. has made the most gratifying business success. Among its present customers are prominent public utility companies, gas station syndicates, garages, repair shops, and service stations.

## Green Engineering Co. Moves Into New and Modern Home.

Of interest to the trade is the announcement that the Green Engineering Co., Dayton, Ohio, has just moved into new quarters, a large fireproof building modern in every way. The whole shop, systematically arranged on one floor, is a veritable sunshine shop, as it is flooded with light from a double set of skylights running the entire length of the building.

The new shop is located on South Main St., a part of the Dixie Highway between Dayton and Cincinnati, which is fast becoming the automobile row of Dayton. This road leads directly to Trailsend, the home of Gov. Cox, and will probably be passed over by more notables in the next few weeks than any other highway.

The Green Engineering Co. specializes in automotive work and has built up a large business in this line in the past eight years. Its Aluminite pistons and connecting rods are now well known throughout the country.

The company also does cylinder regrinding on specially-built grinders and fitting iron as well as Aluminite pistons for all makes of cars. It is especially equipped to do accurate grinding and balancing of crankshafts. Among other products it handles are piston rings and pins, a new spark-plug, which will soon be on the market, and general job work of all kinds in the automotive line.

The Green Engineering Co. is building to special order the C. R. G. Special, a custom-built car of wonderful refinement in all its details. Briefly, this is a 120-inch wheelbase car with Timken axles and cantilever springs on the rear. The motor is a four-cylinder  $4\frac{1}{2}$ -inch bore by  $5\frac{1}{2}$ -inch stroke, specially-built and equipped with Aluminite pistons and connecting rods, making it extremely smooth running, fast and quiet.

The car is equipped with wire wheels and

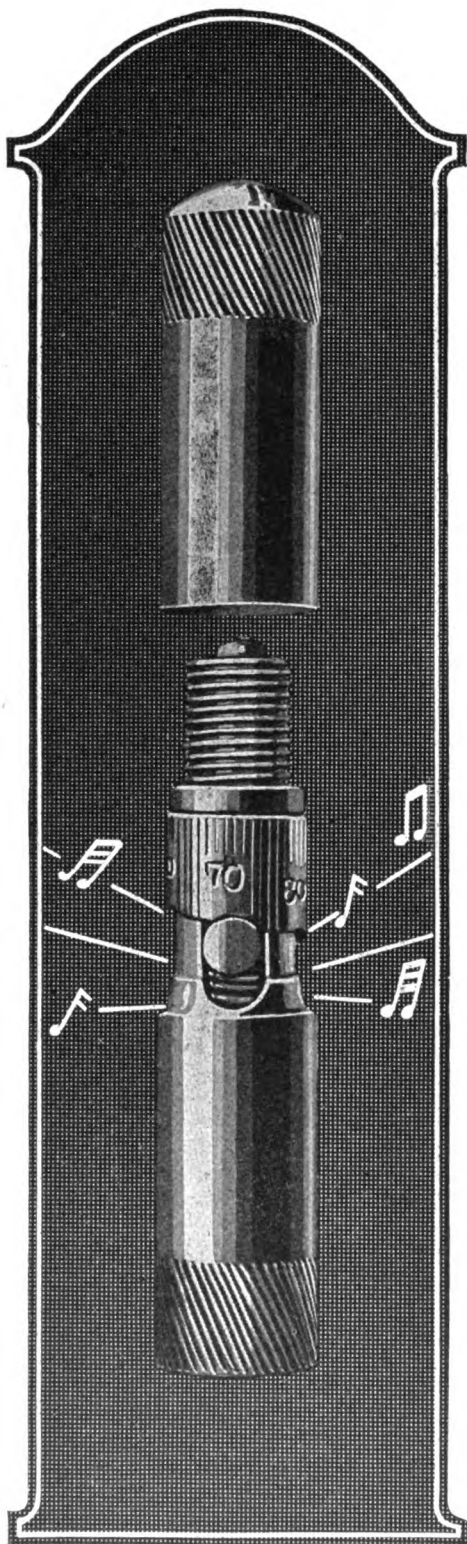


The Large Fireproof Building, Which is New Home of the Green Engineering Co.



# The Whistler

TRADE MARK  
IT WHISTLES WHEN IT'S HAD ENOUGH



Twice Actual Size

WHEN you're figuring on a good, solid, enduring business, it's the steady, consistent sellers that you have to handle.

Every automobile owner in America ought to have a set of Whistler Pressure Regulators. They are necessary for the most efficient and economical operation of a car. They save tires, gasoline, wear and tear and time and trouble.

Sales on this popular new product are increasing by leaps and bounds. Dealers are making quick turnovers and generous profits.

Most people will buy a set the first time the Whistler is explained to them: Simply screw it on your tire valve and set for the desired air-pressure. It never varies. Every time you attach an air-hose, the Whistler warns you when enough air has entered the tire. You can't put any more in! \$4.00 per set of four.

Ask your jobber or write us for details.

*The Whistler is used as regular equipment on Dural Antimony Hand Made Tubes.*

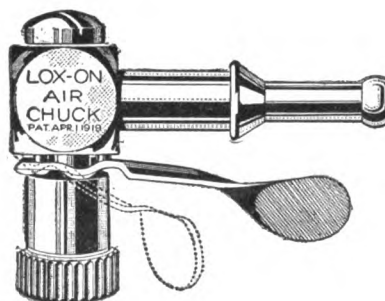
**Automatic Safety Tire Valve Corporation**

1753-1755 Broadway, New York City

Factory, Long Island City, New York

## LOX-ON

TRADE MARK  
**AIR CHUCK**  
"DOESN'T RUB THE RUBBER"



You don't have to push the Lox-on Chuck down over the valve. It slips over it and then grips it! That's why the rubber lasts indefinitely and it is absolutely guaranteed not to leak. You will appreciate the marked improvements in this new air chuck. It saves electric bills, cuts down wear and tear on pumps and increases the efficiency of your air hose connection many times over. Write us for details. \$3.00 each.

will coast for a mile, it is said, from a speed of 60 miles. The gasoline mileage is approximately 18 and the oil mileage about 1,000.

### Book Review.

**AUTOMOTIVE WIRING MANUAL**, the original and official collection of blueprint wiring diagrams, by Harry Lorin Wells. Published by the Automotive Publishing Co., 448 South Dearborn St., Chicago. Sixth edition, 816 pages, 7½ ins. by 11 ins.; 800 diagrams. Price \$15.

"A wonderful book!" That is what you will say—that is what everyone says who sees the Automotive Wiring Manual. Not only is this volume one of the most comprehensive books published on electrical problems, but is also the original and only complete collection of guaranteed accurate and authorized blueprint wiring diagrams.

It contains correct circuit diagrams covering all motor cars and trucks from 1912 to 1920 inclusive; internal wiring connections of generators, starting motors, controllers, etc., of all electric starting and lighting systems; practical instructions on testing, repairing and maintenance of storage batteries, generators, motors, and coils.

Worthy of special mention is the complete index which enables anyone to find the particular car, or the internal wiring of

covering all the elements of electrical equipment as used on motor cars, trucks and motorcycles is clearly and concisely dealt with.

The blueprints, you will say, are most remarkable. Every letter, every figure, every line stands out distinctly, as clean cut as on a cameo. Blue lines on white are, as you know, more readable than black on white, white on black, black on brown, or any other combination. And there is another point of particular importance in the shop—these blueprints do not soil easily through use; they do not show greasy finger marks.

Summary of diagrams to be found in the manual:

650 pages of circuit diagrams of different cars, each page a complete diagram showing all units and their connections.

175 standard and internal wiring diagrams of generators, regulator cut-outs, etc.

A feature of importance is the yearly supplement which is supplied to owners of the Automotive Wiring Manual at a nominal price. This supplement, bound and indexed, does away with the necessity of buying a new manual, for it contains the information and diagrams that will bring the issue which you have up to date.

The Automotive Wiring Manual is indeed a "Garageman's Handbook." Com-

has worked many times. No man can remember 800 separate and distinct wiring plans, but the Automotive Wiring Manual never forgets. It is ten years of experience and study boiled down to a positive and concrete form.

### Fairbanks Co. to Aid in Supplying Marvel Products to Trade.

As a result of the widespread demand for the Marvel cylinder reboring machine, says the Marvel Machinery Co., the Fairbanks Co. with executive offices in New

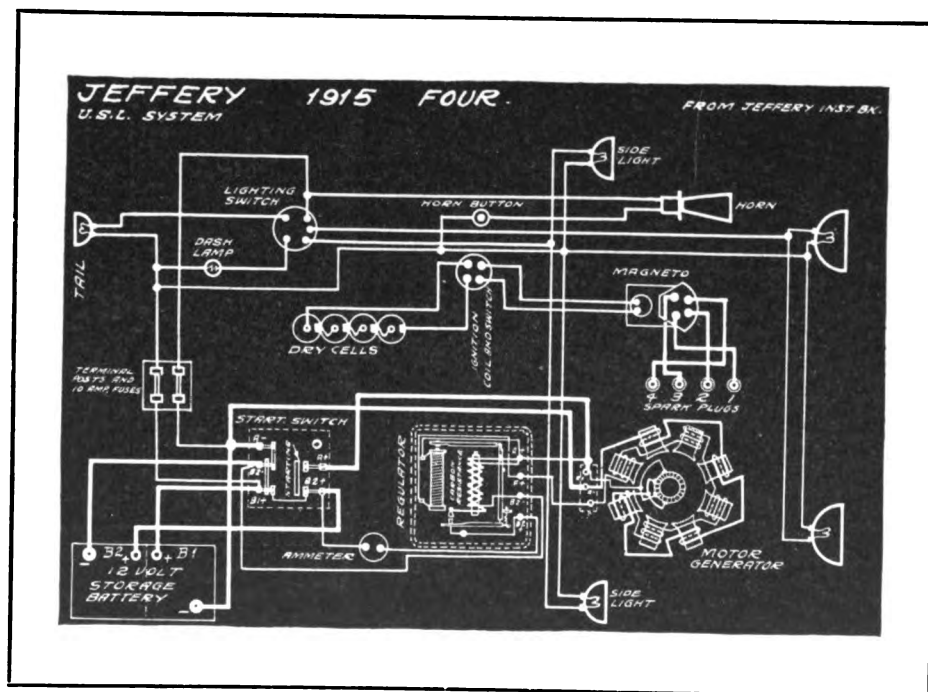


Sales Mgr. Loudon of Marvel is Pleased with Arrangements with Fairbanks Co.

York City, has taken over the exclusive sale and distribution of the machine in the United States and foreign countries.

"We are very much pleased with the arrangement entered into with the Fairbanks Co.," said George S. Loudon, sales manager, recently. "With the Marvel backed by a distributing organization such as the Fairbanks Co. maintains, every live repairman in the world can enjoy the big profits which are to be made from reboring gas engine cylinders. The unqualified success which the Marvel has proved will allow the Fairbanks Co. to give it an unqualified O. K. We feel very certain that the arrangement will be mutually satisfactory."

The Marvel Machinery Co. also manufactures the Marco finished and semi-finished replacement pistons. In order to give prompt service to repairmen, the company has decided to enlarge this branch of the business, and also to enter into the manufacture of pistons on a production scale.



On the Blueprint Wiring Diagram Letters and Figures Stand Out Most Distinctly.

any generator, motor, controller, etc., that is wanted; also the type or model of generator used; the name and size of battery and type of lamp bulbs used. It has been the aim of the publishers of the Automotive Wiring Manual to make the index so complete and so simple that anyone can easily and quickly turn to the page wanted.

A complete analysis of the construction, maintenance, location of faults, and repair

plete instructions covering each consecutive operation in the testing, repairing or rebuilding of all makes of storage batteries are given in detail, thereby making every garage a "Battery Service Station."

A lawyer spends four years learning the principles of law. Other professions require years of study. But the automobile mechanic, although he is a practical man, must guess except on cars on which he

You have a silent partner in your business—one who sells your standard merchandise to farmer patrons every day in the week, year in and year out—and yet draws no salary and demands no share of your profits.

Farm Journal is that salesman—a buyer's guide consulted and relied upon by the leading farmers in every community in the United States—as many as a thousand within buying distance of your town.

*If you want some mighty valuable information that will help you buy goods that move, get your Postmaster to tell you how general magazines and farm papers compare in circulation in your territory. Then you'll buy goods advertised in farm papers. And write us for the number of Farm Journal families handy to your store—buyers ready to give you profits, if you will let them*

GOODYEAR

Elgin

Barrett

YALE

NEW EDISON

O Cedar  
Pollen

# The Farm Journal

CHICAGO

PHILADELPHIA

NEW YORK

*Sells Most Goods Because  
Read by Most Farmers*

DISSTON Moline Maytag ACME QUALITY PAINTS & FINISHES Firestone CONGOLEUM Gold Seal ART-RUGS Westclox BLABON Linoleums Cletrac BANK TYPE TRACTOR V-K WATER SUPPLY SYSTEMS DE LAVAL VICTROLA ARMOUR COMPANY Pillsbury's Goodrich "Wear-Ever" COCA-COLA "Unlike any other paper" FLORENCE Apollo Roofing Products BEEMAN ONE HORSE TRACTOR NEW IDEA LIQUID VENEER PERFECTION HINMAN MILKER INDIANA ALL-ROUND TRACTOR ATKINS Lucas Paints Swift & Company CASE Pepsodent Ingersoll Planet Jr. MUELLER FURNACE



### Spark-Plug Salesmen Hold Record-Breaking Convention.

The eighth annual sales convention of the Champion Spark Plug Co., recently held at Toledo, Ohio, was a record breaker from every standpoint according to a bulletin issued by the company. The attendance surpassed that of any previous convention, over 150 men representing the sales force of the United States and Canada attending.

Prior to this year, all "Champion" conventions were limited to one week's time, but this year it was found necessary to extend the session over a period of two weeks in order to accomplish the work outlined for the salesmen both individually and as a whole.

The first week of the convention was in charge of the executives of the sales department. The formal opening was followed by an address of welcome by President R. A. Stranahan, who reviewed the growth of the company year by year since the time of its inception and announced that all production records had been broken during the first six months of 1920, when the plant turned out over 16,000,000 spark-plugs.

While regular business sessions took up the greater part of each day, Mr. Caswell,

the men to and from Detroit, while a fleet of 35 Columbia cars took care of the visitors during the day.

Another day was given over entirely to an outing on Lake Erie. In addition to a wonderful sail down the lake, the men had an opportunity of visiting Cedar Point and enjoying a dip in the water. More entertainment was furnished the following night.

After roll-call one morning it was announced that the day would be given over to a sales drive on Champion plugs in Toledo and nearby towns. The men were divided into crews, each crew assigned a certain district, and told to go to it.

The last two days of the gathering were given over strictly to business. Special class meetings, supervised by the territorial managers, kept the men busy until time for them to start back home.

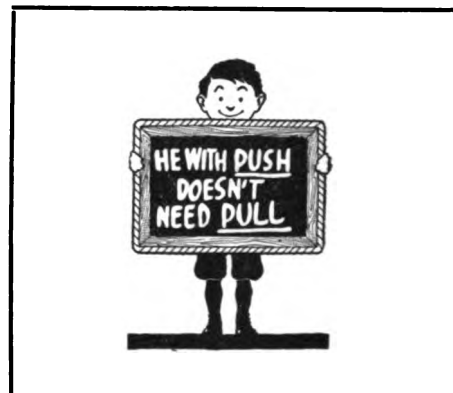
### Boy and Slate Sign Exclusive Advertising for En-ar-co Dealers.

Whenever you see the smiling schoolboy with his slate, you will stop and look again, for his is a message with a punch. The boy and slate sign is a feature of the service offered by the National Refining Co. to dealers in its products.

Five years ago the advertising depart-

mented upon. The epigrams became popular at once.

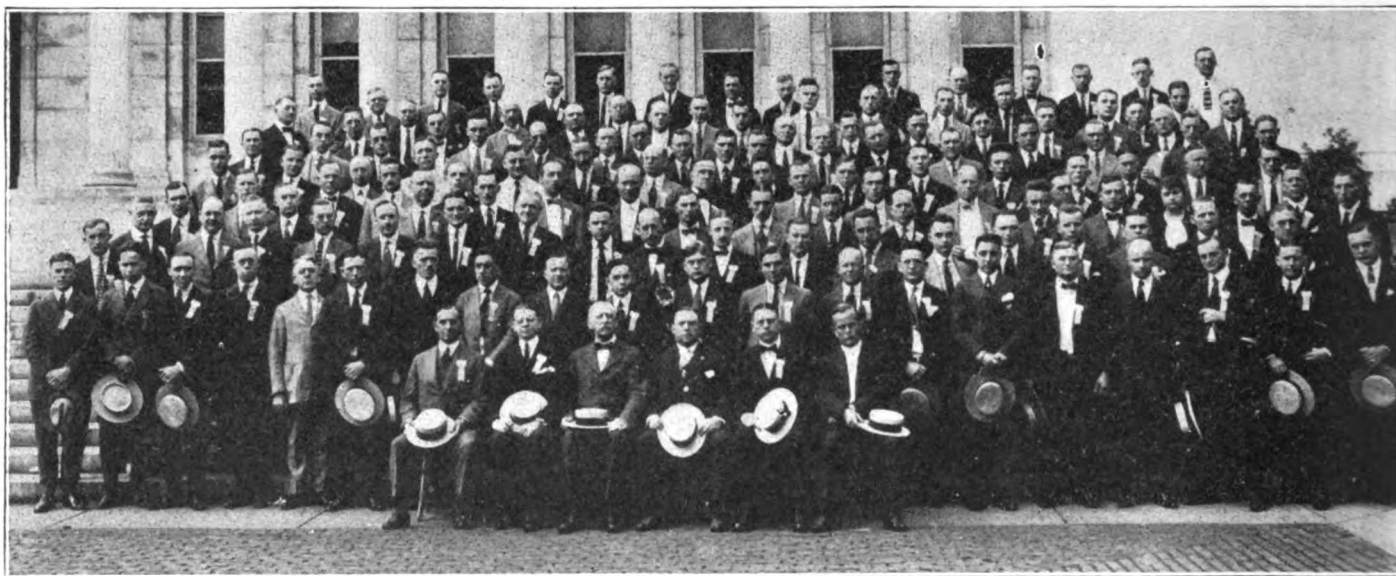
Paper signs would not stand the weather, however, and the boy and slate signs were installed. The schoolboy has already won the admiration of thousands. And the



The Smiling Schoolboy with His Slate.

clever sayings are everywhere attracting attention. The messages are written by Chas. L. Archbold, advertising manager.

The cut-out signboard stands six feet high, with a writing surface on the slate three feet high by five feet wide. The weatherproof sign is painted with several coats of paint in black, red, pink and white.



Over 150 Representatives Attended the Inspiring Sales Convention of Champion Spark Plug Co. at Its Home Plant.

director of sales, saw to it that plenty of recreation was offered the men. Business and pleasure were combined in a trip through the plant of the Champion Spark-Plug Co. of Canada, Ltd., located at Windsor, Ont. A special train carried

ment of the National Refining Co. conceived the idea that witty, pithy sayings in the form of epigrams written upon a large piece of paper and posted in front of its service stations where the public could read them, would attract attention and be com-

The advertising department of the National Refining Co. furnishes the dealer every month with a 30 days' supply of epigrams. These are to be changed every other day. For further particulars write to the National Refining Co., Cleveland, Ohio.

**Foster**

**Auto Repair Creeper**  
I ETAL CONSTRUCTION

Angle Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

**FOSTER BROS. MFG. CO., UTICA, N. Y., U. S. A.**

**\$5.00**

Ask for the name of the Foster distributor in your territory.

**DIRECT REPRESENTATIVES**  
Eastern and Southern States: Asch & Co., 16-24 W. 61st St., New York, N. Y. For the Mid-West: Jenson & Thompson, 1421 S. Michigan Ave., Chicago, Ill. Pacific Coast & Intermountain Territory: McDonald & Linforth, 739 Call Bldg., San Francisco, Cal.





## The HARVEY GUARANTEED SPRING — The Spring with an Insurance Policy

**W**HEN you prepare to take out life insurance an examining physician thumps and sounds you thoroughly, and if you are healthy you are given a policy.

We are so confident of the soundness, strength and quality of the Harvey Spring that we offer an insurance policy of another kind to every purchaser of a Harvey Boltless Spring. This is the Harvey guarantee—broad and unconditional.

This guarantee insures the strength and resilience of the Harvey. It also insures you, the dealer, against worry and trouble such as result from selling a spring the makers of which cannot guarantee.

The Harvey Boltless Spring is practically unbreakable and non-sagging. The emergency that causes the car owner with ordinary springs to bring his car home with a broken spring is nothing but a cushioned jolt for the Harvey Spring.

This remarkable strength and resilience is obtained by manufacturing standards of the highest order of which the patented Harvey process of heat-treating and tempering and rigid factory tests are features.

You can sell the Harvey Spring, firm in the knowledge that you are making a sale that will create customer satisfaction and resultant business increases.

Send for the Harvey Book of specifications for more than 1500 kinds of springs. We will also tell you of our selling aids for dealers.

### Harvey Spring & Forging Co.

1049 Seventeenth Street  
RACINE, WIS.

**Harvey**  
**RACINE**  
BOLTLESS  
AUTOMOBILE  
**SPRINGS**

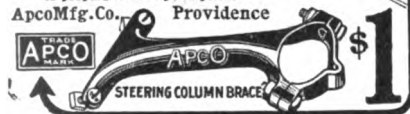
Easy Riding — Guaranteed

## APCO Equipment for FORDS

### Stop that rattling Steering Wheel on Your Ford

The steering column brace eliminates all vibration of the wheel and holds it solid. Other cars use one - *Fords Need It.*

Sold by dealers everywhere, or prepaid on receipt of price.



### Put Your Ford Horn where you can reach it.

It is attached to the throttle or gas lever where it is under the driver's finger at all times.

**APCO Horn Button**  
consists of button, bracket and wire  
Sold by dealers everywhere, or prepaid on receipt of price  
APCO Mfg. Co., Providence, R. I.

### Does Your Ford Wander off the Road?

#### FRONT AXLE BRACE

Holds axle firmly in position, reinforces front radius rod preventing bending and breaking.

Stabilizes the whole front of your car  
At your dealer or send his name with your order direct to  
APCO Mfg. Co., Providence, R. I.

**\$2.50**

Also made in Angle Steel - \$1.50

### Hitting on all Four

The testing valve in the new  
**APCO MUFFLER**  
tells you at once and finds the skip if there is one. It can't explode, loosen or rattle and is designed to muffle the exhaust without back pressure.

At your dealers or if not sent direct on receipt of price.  
APCO MFG. CO. PROV. R. I.

**\$5 COMPLETE**

**MAKES YOUR FORD MORE CAR**

### Is Your Ford Full of Rattles?



**STOP** this source of annoyance and danger at once with—  
**APCO Anti-Rattlers**  
Heavy springs automatically take up the wear  
Radius Rod 1 in a box 50c ea.  
Steering Rod 2 in a box 50c pr.  
At your dealers or send his name with your order direct to  
**APCO MFG. CO.**  
Providence

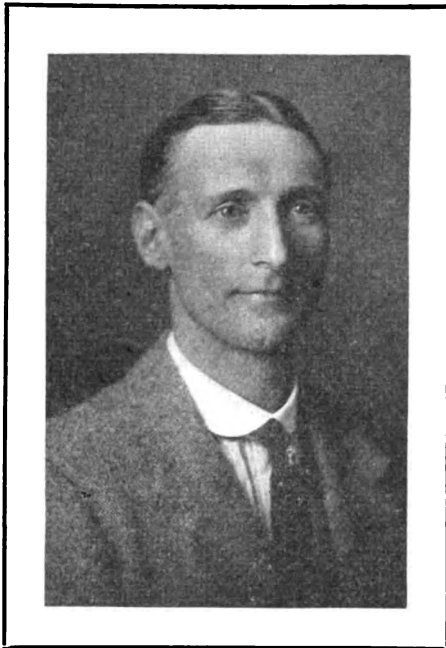
**Send for Our Catalog  
and Price Lists**

**APCO MFG. COMPANY**  
Providence, R. I.

### Visitor Plans European Distribution of Shaler Products.

The English engineer and inventor, W. H. Miles, is making a flying visit to this country for a conference with C. A. Shaler Co. in connection with the marketing of several of his devices.

Among Mr. Miles' best known inventions is the solid fuel type of vulcanizer,



W. H. Miles Invented the Solid Fuel Type of Vulcanizer.

the patents on which have recently been sustained in the U. S. Circuit Court of Appeals. It is under these patents that the Shaler company holds the exclusive license to manufacture vulcanizers of the type of the well-known Shaler 5-minute vulcanizer.

The direct purpose of Mr. Miles' trip is to complete plans for distributing Shaler vulcanizers and roadlighters throughout Europe from the factory which the Shaler company has recently established in England, and for the vigorous prosecution of infringers who have been availing themselves of foreign markets since the courts have stopped their operations in this country.

Mr. Miles reports an unprecedented demand for American accessories of all kinds, especially equipment for repair shops and articles designed to enable car owners to make their own minor repairs and adjustments.

### A Compound That Removes Carbon and Benefits Motor.

Ever since the birth of the practical gasoline motor, the problem of dealing with carbon deposits and their destructive effects has been an important one. But a really effective means of overcoming carbon difficulties seems to have been considered as more a thing of the future than of the present.

Now comes the firm of P. J. Chasler,

manufacturing chemists, and announces that it has perfected a compound which is comparatively low-priced, and which it guarantees will remove every bit of carbon accumulated in the motor. It is further stated that not only is this preparation harmless to the motor, but it actually benefits it.

The method of applying this carbon remover is to pass it through the carbureter, like gasoline. It ignites as readily as the gasoline, and accelerates the motor. At the same time it rapidly dissolves all carbon deposited and completely drives it out through the exhaust. The entire operation need not take more than a few minutes.

According to Mr. Chasler, conclusive experiments have demonstrated beyond any doubt that this carbon remover entirely frees the motorist of all carbon trouble.

At present the bulk of the sales of Chasler's carbon remover is effected direct, but the company expects to have full dealer distribution in a short time.

### Articles of Incorporation of Steam Bag Corp. Are Filed.

It is announced that articles of incorporation of the Steam Bag Corp. have been filed by Denver men. Offices have been opened at 1545-1547 Broadway and a factory started at 1222 Eltai St., Denver.

The steam curing bag is a vulcanizer for rubber, especially rubber tires. The intense heat held in it is said to cure, at a uniform temperature, the rubber both inside and outside. This year a steam bag large enough to handle 6, 7, and 8-inch pneumatic truck tires was perfected.

The steam vulcanizer is the exclusive property of the Denver corporation which holds basic patents in the United States, Canada, Great Britain, France and Germany. Some of the largest tire manufacturers in the world, it is said, use the Denver-made steam bag.

### Pabeco Equipment for the Busy Battery Shop.

Success in the battery business is now a matter of the kind of service you give, and service depends on the convenience of your equipment.

For the service station owner, the Pack Battery & Equipment Co. in its new catalog has compiled a conveniently arranged assortment of high-grade, standardized service station equipment, featuring articles manufactured by some of the largest concerns. Among the products listed are battery steamers, charging outfits, rectifiers, and magneto testers.

The catalog is illustrated to enable the buyer to make selections to the best advantage. The company guarantees all goods to be just as represented.

Send for catalog No. 3. You will find it valuable. The address is Pack Battery & Equipment Co., 1409-11 McGee St., Kansas City, Mo. Mention the American Garage & Auto Dealer when writing.

# THE ROMORT AIR & WATER STATION

## Twice the service in half the time

### Does It Pay?

*Here is the answer in the exact words of a dealer who recently installed a Romort Air and Water Station.*

Your Romort Air and Water Station is a wonder—it has already increased my business to quite some extent.

I find that a great many automobile owners who have never done business with me before, stop for air and water. I am positive that the clean, quick and efficient method for dispensing air and water thru the Romort Air and Water Station is having an effect on automobile owners who are using this service, for a lot of these owners are now giving me their repair business as well as purchasing their accessories at my store.

**If I could not purchase another Romort Air and Water Station I would not dispense with the one I now have for twice its price.**

I am a strong believer in advertising that produces results and I feel that it is the best and cheapest advertising that I could secure.

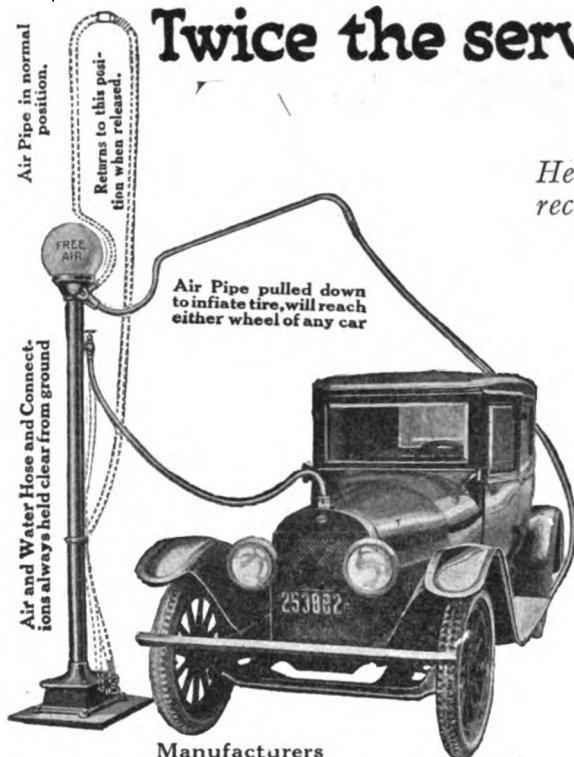
*Why not put a Romort Air and Water Station to work for you, too? It means the making of new customers, more business and fatter profits.*

*A postal will bring full details.*

Sales Dept.

**THE ZINKE CO.**

1323 Michigan Ave., Chicago, Ill.



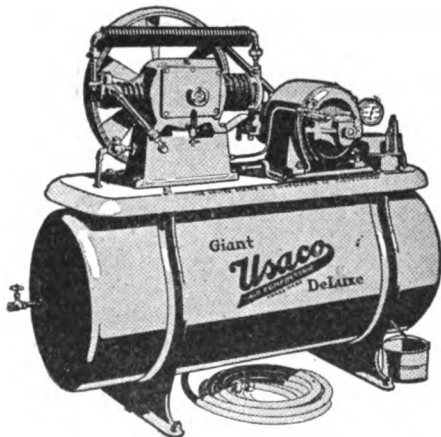
Manufacturers

**THE ROMORT MFG. CO.**  
Oakfield, Wis.

**"Quality Remains Long After the Price Is Forgotten"**

The Usaco Giant De Luxe, capacity 7 cu. ft. per minute. Has 60 gallon tank tested to 500 pounds and suitable for working pressure of 250 pounds. Of the same general design as the Standard, but with greater capacity, having a more powerful motor and tank with double capacity.

Particularly adapted for the gruelling service encountered in inflating giant truck tires, a service which it handles with gratifying speed and ability. Also furnished in portable form.



The Usaco Standard De Luxe, capacity 4 cu. ft. per minute. Has 30 gallon tank tested to 400 pounds and suitable for a working pressure of 200 pounds. A completely automatic unit of the highest quality. Furnishes high pressure air in great volume for tires of all sizes and pressures and is quiet running and practically foolproof.

Also furnished with 60 gallon tank or with wheels to provide portability.

## Two Names That Assure Dependable Quality— STERLING

**Usaco**  
AIR COMPRESSORS  
TRADE MARK

**J**UST as the word STERLING on silverware is accepted as the mark of dependability, the name Usaco is being universally established as an assurance of highest quality and all 'round serviceability in an air compressor.

The evolution of this reputation dates back to the day when the Usaco Two Stage Air Compressor was considered years in advance of the times, because of its superior state of development. But, changing conditions, entailing an increase in the volume and severity of air compressor demands, brought the Usaco Two Stage Compressor into its deserving position. In much the same manner as tungsten lamps have completely replaced carbon bulbs, the Usaco Two Stage Air Compressor is "leavening the whole lump" of Air compressor opinion.

Usaco Quality is inbuilt—tangible—the result of knowledge of what to do and what not to do gained through years of experience. In every detail it involves refinements and mechanical improvements that place it on an incomparable high plane of efficiency. Insist upon the genuine Usaco Two Stage Compressor. If your jobber cannot supply it let us send the name of one who can. In any event get the Usaco literature and be conversant regarding the latest developments in air compressor design.

**The United States Air Compressor Co.**  
5308 Harvard Ave. Cleveland, Ohio

Please send literature advertised in American Garage and Auto Dealer to name written on margin. My jobber is.....

## Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

**Over 350,000 sets now in use**

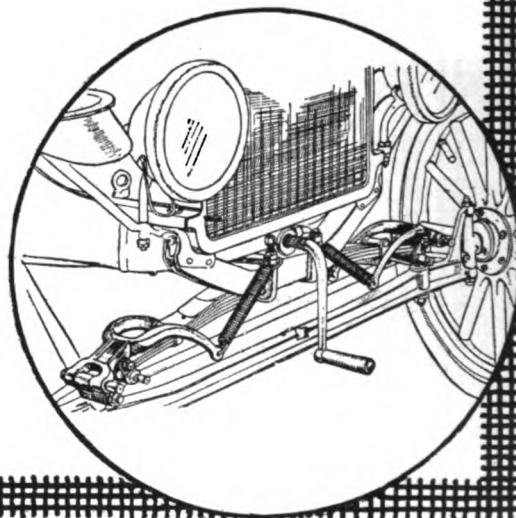
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

**Price \$12.00 per set of four.**

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

**P. H. Webber Company**  
HOOPESTON, ILL.

Chicago Sales Office:  
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.  
In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.  
London, Ont., Canada



## You get a good share of the profit.

The MODEL "N" MARVEL CARBURETER improves car performance, and increases mileage from 22 to 25 miles per gallon.

No changes are necessary to install it. Fits right in place of regular installation.

## MARVEL CARBURETER

*Designed especially for FORDS*

sold on 30 days' trial, with money back if not satisfactory.

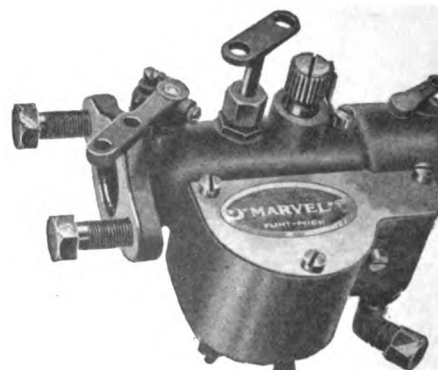
**Price F. O. B. Factory \$10.00**

MODEL "E" CARBURETERS are standard on Buick, Oakland, Nash, Scripps Booth, GMC, Wilson and all ¾-ton U. S. A. Government Trucks.

MODEL "E" Carbureters greatly improve Maxwell, Overland, and Studebaker cars.

DEALERS--If interested, write for further information

**MARVEL CARBURETER COMPANY**  
FLINT, MICHIGAN, U. S. A.





## Speed up the turnover on those Used Cars

You can't expect the buyer to know what used cars *YOU* have to sell unless *YOU* tell him.

**SAVE**  
**\$100 TO \$200 ON**  
**THESE FINE CARS**

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| FRANKLIN | LOUISINE   | \$595  |
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| MERCER   | TOURING    | \$995  |
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All In Good Condition

MODEL H520



## SIGNS

Not only do this, but they modernize the appearance of your show room.

A changeable sign—strong white on black (quick changing) that graces the magnificent show rooms of the Metropolitan Auto Rows will brighten up and put life into *YOUR* place too.

UNITYPE SIGNS sell your used cars for you—they bring you new customers from off the street.

UNITYPE SIGNS are all metal and come in many sizes and styles at prices within reach of all.

*Literature for the asking*

**W. L. CLARK COMPANY**

115 Nassau St., New York, N.Y.

## The Final "Fire Tool"



## The WASHBURN Torch

Take a good look at the above illustration. This man is *aluminum-welding* — with the *Washburn Torch*. The Washburn Torch is the latest, most advanced development in torches. There has never been anything like it. This torch is all other torches combined. It is *finality* in "fire-tools."

The Washburn Torch will handle *every job* in your shop requiring flame work — brazing, lead-burning, welding, soldering, radiator repair, battery work, Oxy-Acetylene work—the list is endless.

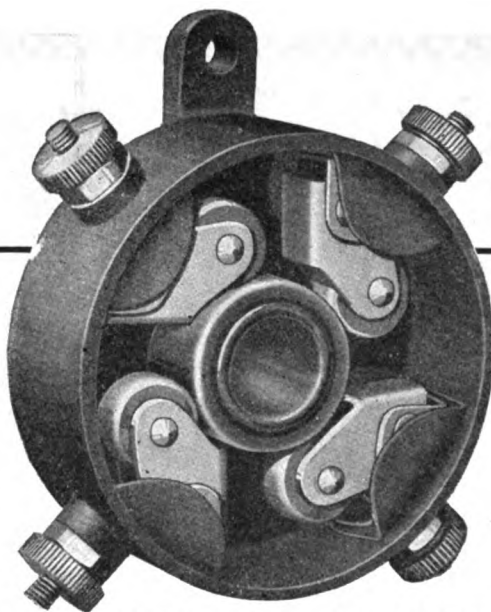
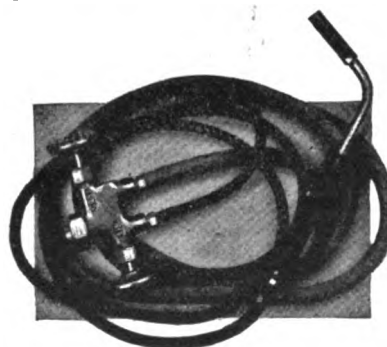
It's the adjustable needle-pointed flame that makes the Washburn Torch all torches in one. You adjust this flame instantly to any heat between 1620° and 5300° Fahrenheit—a controlled range of 4000 degrees without changing tips. All this from Prest-O-Lite gas and air, mixed through the Washburn Mixer.

Now we go even beyond this great range of temperatures by changing to the Oxy-Acetylene tips furnished, and burning Oxygen and Acetylene. The same torch, mind you, *with just a change of tips*.

For fuel economy, adaptability, lightness and completeness, the Washburn Torch has everything else in torches backed off the boards—and we can prove it. Its price (\$25.00) is way below the measure of service it renders.

Send your order to your jobber or write us for further information.

**WASHBURN BURNER CORPORATION**  
**KOKOMO - - INDIANA**



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## DUNTLEY 4 UNIT TIMER

*For Ford Cars*

*For Fordson Tractors*

Particularly designed to meet the severe requirements of the high speed motor of a Fordson Tractor, its absolute infallibility on a Ford motor is doubly assured. With four individual wear and trouble proof ignition units that never fail, its absolute insurance of an easy starting and a smoothly running motor, maximum motor efficiency and utmost economy in fuel is guaranteed at all times and under all conditions.

DEALERS—"Our Proposition is interesting"

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**Y**OU are not making the profits you should out of your garage unless you are equipped to handle reboring jobs along with your general motor repair work. With Storm Motor Repair Equipment you can handle all motor rebuilding work quickly and accurately. You don't need experienced men. *Storm Tools are made by practical men for practical purposes.*

Storm money-making tools include—the Storm Standard Reboring Machine, the Valve Port Renewing Tool, the Connecting Rod Bearing Reamer, Jig and Straightening Gauge, the Special Piston Vise, and the Main Bearing Babbiting and Boring Tool.

Get ready for the big Spring business. You can make *your garage headquarters* for repairs in your neighborhood. Write us today.

**Storm Mfg. Co.**  
Minneapolis, Minnesota  
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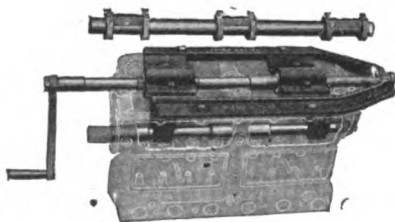


**The Storm Standard  
Reboring Machine**

Made in various capacities for hand or power operation. Head is provided with six duplex spiral cutters, with universal adjustment for reboring different sizes and to permit regrinding and resetting. There is a Storm Machine for your individual requirements.

**The Storm Main  
Bearing Babbiting  
and Boring  
Tool**

Puts in a new, perfect bearing exactly the same as the original and in the proper position. Operation is simple and can be completed in less than thirty minutes.



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**MOTOR REPAIR EQUIPMENT**

Give the AMERICAN GARAGE AND AUTO



## SAVE TIME SAVE MONEY

Grind valves the best,  
easiest and quickest way

## ECLIPSE Electric Valve Grinders

with Famous Ballistic  
Movement

**DO ALL OF THAT**

Just a little grinding compound spread on the valve, a minute or so with the grinder and both valve face and seat are smoothed to a clean, hard finish—absolutely gas tight. No grooving, no scoring—the rapid oscillation prevents all that and the slow rotation insures an equal amount of treatment to every part.

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## Air! the life of the tire depends on it

Do not be afraid to press  
the purchase of a  
**SCHRADER UNIVERSAL  
TIRE PRESSURE GAUGE**  
on a customer.

He will thank you for it  
after he discovers the  
saving in both tires and  
gasoline that it makes  
possible.

Price \$1.50

**A. Schrader's Son Inc.**  
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*Dealers and garage and repair shop owners—*  
Patronize our extensive Radiator Department.  
**IT WILL PAY YOU.**

*Prices and samples of Core on Request*

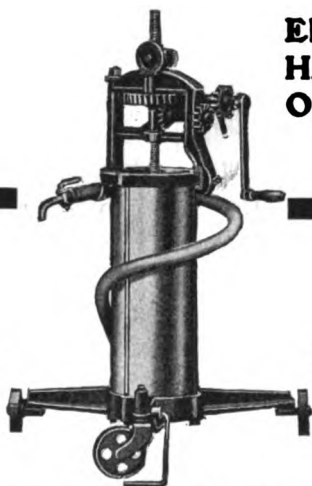
**INTERNATIONAL RADIATOR CO.**

DEPT. B

1507 Michigan Ave., Chicago, Illinois

**POURS  
OUT  
STEADY  
PROFITS**

**ENTIRELY  
HAND  
OPERATED**



Model K holds  
20 lbs. grease  
or 2½ gals. oil.

Model N holds  
56 lbs. grease  
or 7 gals. oil.

### Ekern "Model N" Portable Garage Grease Gun

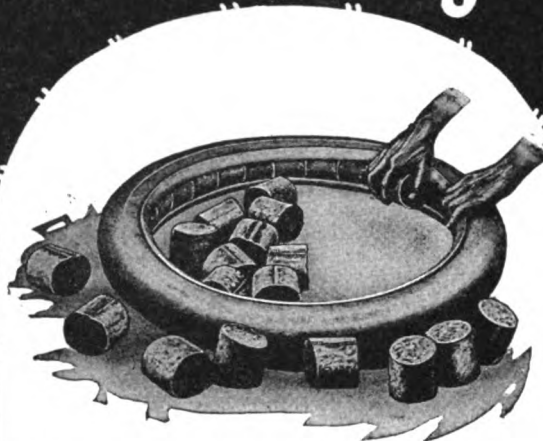
Undoubtedly there is scarcely any garage equipment which is absolutely indispensable; yet there are a few products which come mighty close to being necessary. Among these, our "MODEL K" and "MODEL N" PORTABLE GARAGE GREASE GUNS are very prominent.

*Address us today for full particulars.*

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### Trouble-proof tires with ample resiliency

is a combination that was long sought by the motoring public. Some tire fillers failed to stand up under long service—most of them lacked the essential resiliency. But these two vital qualities were at last combined in

## NATIONAL RUBBER TIRE FILLER

It has brought joy and satisfaction to tens of thousands of car and truck owners. It has done away with punctures, vulcanizing, patching, tire repairs of all kinds. Users get 10,000 to 20,000 miles out of every tire.

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National Rubber Filler is made of the best grade of rubber, cut in small particles, treated, moulded and vulcanized by our special process. The result is a compound that is light, strong and resilient. Made in sizes to fit all standard tires. It is laid in the tire and not melted or poured in. Will not harden, freeze, or melt—fully guaranteed against deterioration in any form.

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DETROIT SPECIAL

OVERALLS & COMBINATION SUITS

Where They  
Excel

*The Pig on the Label  
Guarantees Wear, Fit and  
Comfort — Satisfaction.*

Finck's Combinations will satisfy you as they have satisfied thousands of wearers who work around automobiles. You can wear them over any clothing and they afford perfect protection. They are comfortable—plenty of leg room, plenty of sleeve room, plenty of seat room—absolutely no binding anywhere in any position. That's because Finck's Combinations are cut over big patterns. So even after washing they fit perfectly. And because they fit without binding and are so perfectly constructed of the best grade of material they "Wear Like a Pig's Nose."

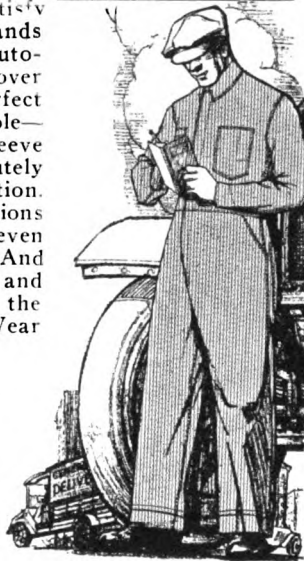
Ask your dealer for Finck's Combinations. If he can't supply you write us.

**W. M. Finck & Company**  
Detroit, Michigan

Manufacturers of High Grade Overalls, Men's and Women's Combination Work Suits

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## You Don't Guess the Answer You READ It on the Blade

Cylinder measurements guaranteed accurate to within .00025" and less.



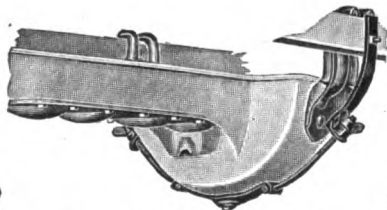
## The AM-PÉ-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

Get the whole story in our Circular

PRICE \$2.50

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MARSHALLTOWN, IOWA



Patented Sept. 11, 1917

## The JOHNSON Crank Case Support

"The most essential equipment for  
Ford Car or Truck"

PREVENTS

Breaking of Crank Case Arms  
Loose Crank Case Arms  
Oil Leaks Vibration

Invaluable when a crank case arm is broken. Do not detach the broken arm—simply attach the Johnson Crank Case Support which will hold the engine firmly in place.

DEALERS—Here's a sure seller to every Ford owner. Write at once for full information

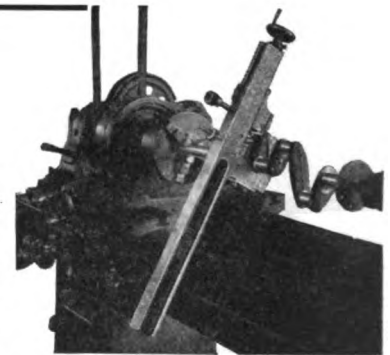
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## No Filing No Offsetting No Jigs

The Weber Tool turns ALL Pins from ONE setting of the Crank Shaft, ON CENTERS. It is the only Tool of its kind that will leave a pin absolutely parallel to the main bearings. The cutter used is a Forming Tool, cutting entire width of pin at once. A micrometer dial enables operator to gauge his cuts and turn all pins to a uniform size.



Perfected and Proven

to gauge his cuts and turn all pins to a uniform size.

## Weber Crank-Pin Re-Turning Tool

How many times have you assembled a gas engine, knowing full well that the crank shaft needed truing up? You did not want to send it out and delay your customer. You knew, too, that it would cost considerable to have it done.

With the Weber Tool *you can do* this work whenever necessary. NO DELAY—NO EXPENSE.

Why not do this work *in your shop* and have more satisfied customers and put *more profits* in your own pocket?

The Weber Tool is guaranteed to turn crank-pins within as close limits of accuracy as any other known method.

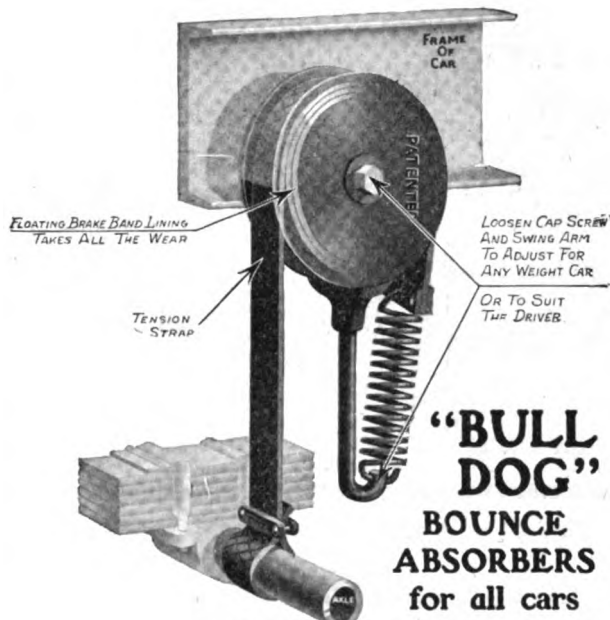
Picture at top shows Weber Tool in operation on 4-throw Crank Shaft. All four pins are turned and finished from this one setting. Write for Circular and prices or ask your jobber.

**Sawyer-Weber Tool Mfg. Co.**

356 South Alameda Street  
Los Angeles, Cal.





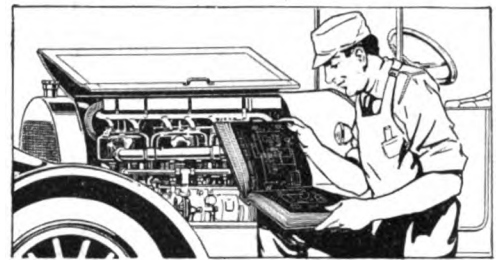


Patented March 23, 1920

Wonderful opportunities await the dealer who has not yet stocked up on this fast seller. The "BULL DOG" Bounce Absorber is the only device of this character that can be adjusted easily to the requirements of the different weights of cars or driver's style of driving. No metal parts to wear and no oil necessary. A car equipped with "BULL DOG" Bounce Absorbers gets better tire service, more mileage on gasoline and is proof against broken springs.

DEALERS—Get your territory supplied.

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## Automotive Wiring Manual

is what you need to render quicker and more accurate electrical service and make more money. There is nothing to equal it on the market at any price that gives you the authentic, down-to-date electrical information on any and all cars and trucks as contained in the new 1920 edition. Contains blueprints on all cars and trucks from 1912 to date.

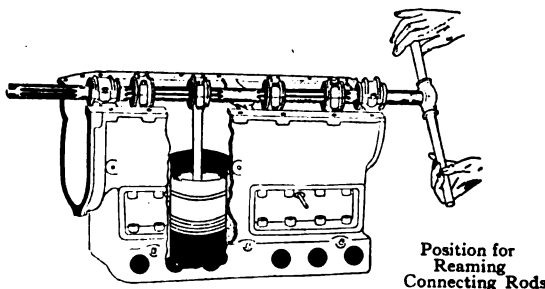
Over 800 blueprints; over 600 models of cars; 200 internals. Full size of blueprints,  $7\frac{1}{4} \times 11$ ", large enough to be easily read; no need for magnifying glass to make out details. Bound in one volume, thus always complete, an advantage you cannot secure elsewhere.

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Your reputation as an Electrical Expert will not be made through an occasional lucky guess. You should know every time just what you are doing. The best assurance that you will is through the purchase of the Automotive Wiring Manual—1920 Edition. Price \$15.00 delivered.

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## The First Three Jobs Pay for this LEWIS REAMER

It only takes an hour and a half to ream the seven bearings in a Ford motor as against eight hours by the hand method. Your profit is further increased by the fact that you do not need an expert mechanic to operate your Lewis Reamer. Moreover you get a 100% perfect job every time and your customer is sure to be satisfied.

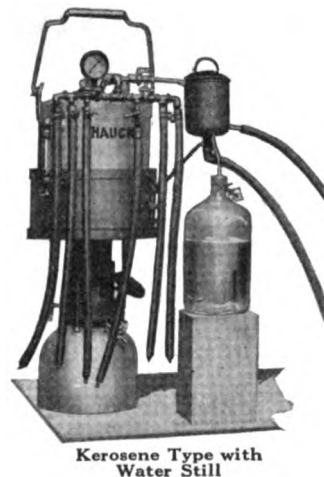
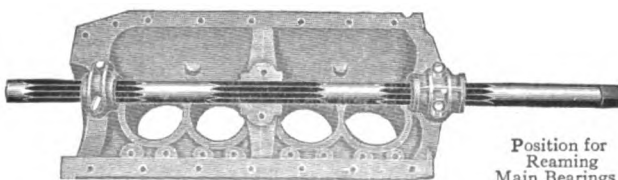
The Lewis Combination Aligning Reamer works equally well on full or undersized bearings.

Ask your jobber or write us for full details.

## LEWIS TOOL COMPANY

612 Fifth Ave. South

Minneapolis, Minn.



OPEN YOUR BATTERIES WITH A

## HAUCK STORAGE BATTERY STEAMER

Batteries opened in 3 minutes.

Steam generated in 4 minutes.

A simple and practical way of softening the compound to remove the rubber covers, jars and cell plates without injury by applying steam through the vent holes. There is no warping of battery cases.

The Hauck Storage Battery Steamer is supplied either with a gas burner or a kerosene furnace. The rust-proof steam generator is  $2\frac{1}{2}$  gallons capacity. It is equipped with steam gauge, and safety release valve. The composition hose tips are not affected by acid.

The water still, compound kettle of  $1\frac{1}{2}$  gallon capacity, 35 lb. capacity melting pot, lead mold, water gauge and water inlet are all extra parts and furnished only when ordered.

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AGENTS WANTED

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The road shock that would put the average Ford front spring out of business, is absorbed by the loops in the top leaf of the "Saveur" Ford Front Spring. The whole spring lasts longer—so does the car, because it is not being shaken to pieces by flattened ordinary springs.

### The "SAVEUR" Ford Front Spring

is oil tempered throughout, and graphited for two years' service. It fits exactly—is flexible, easy riding and doesn't squeak. While helping save the motor, it reduces axle, radius rod and steering knuckle breakage.

"Saveur" Ford Front Springs carry the usual New Era Guarantee against breakage. If one goes bad it will be replaced free of charge. They have been on the market for eight years and we are selling more than ever.

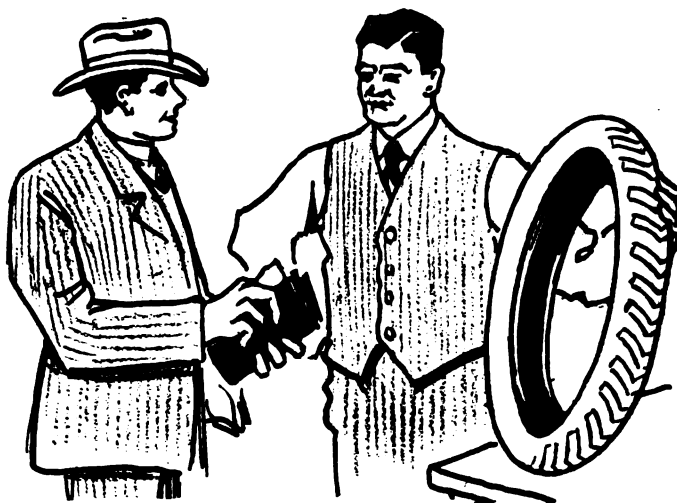
Send for the New Era catalog—bumpers, springs, tire carriers—complete in every way. Order from your jobber or direct from us.

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By giving them 5000 or more additional miles at a moderate cost. No matter if your tires are punctured, sand-blistered, rim-cut, or blown-out—send them to us. We remake them by a process that gives them more mileage than many of the new tires sold nowadays.

DEALERS—We have an interesting proposition for you. Write today for full particulars.

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for service and reliability

The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

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Write today and feel free to consult our Engineering Department.

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## HARNER'S ALUMIFLUX REPAIRS ALL METALS

All repairs can be made with ALUMIFLUX without removing the part from the car. ALUMIFLUX will work successfully with aluminum, copper, iron (gray, malleable, or galvanized), tin, zinc, lead or brass.

Not affected by gasoline, oil or water, hot or cold. Will stand heat up to 600 degrees and pressure to 250 pounds.

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## AUTOMOTIVE "EQUIPMENTLY" SPEAKING

OUR LOCATION HAS ENABLED US TO BECOME  
QUICK SHIPPERS

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FOR THE "BIG FIVE"

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WE ARE TERRITORIAL DISTRIBUTORS FOR  
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AUTOMOTIVE EQUIPMENT

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## The Instrument for the Average Garage

### Stop Guessing—Know the Truth!

Equip your garage with the

# Weston

Model 441

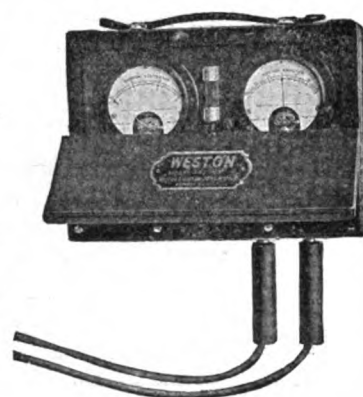
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and give your customers the kind of service they demand. It means business for you. The "Fault-Finder" is a voltmeter and an Ammeter mounted in a durable, compact and convenient carrying case. The Voltmeter ranges of 0.2-0.3 and 2-0-30 volts enable the user to test out every part of the electrical equipment for practically every trouble. The ammeter range of 30-0-30 amperes is right for determining charge and discharge rates, for adjusting relays, etc. The ammeter is protected against burn-out by a standard automobile type fuse accessibly located. Long rubber covered flexible cables with spring terminals are used for making connection between the instrument and the apparatus under test. A complete instruction book accompanies each instrument.

Get Ahead of Your Competitor. Write at once for information.

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## America's Aviators Used

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## High Compression PISTON RINGS

### The Standard of Efficiency

**BURD HIGH COMPRESSION RING CO., Rockford, Ill.**

## PROPER TIMING MEANS BIGGER REPAIR PROFITS

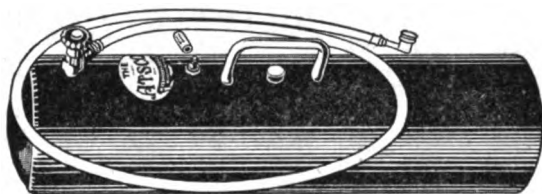
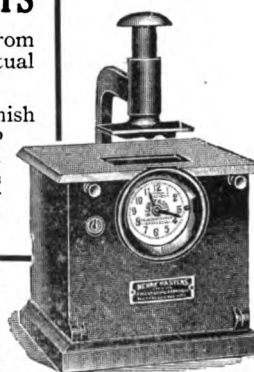
The only way to get proper returns from your repair work is to know the actual time consumed on each job.

**Henry Kastens Time Stamps** furnish an accurate record of just how long each job takes—the correct basis for repair charges.

It stops the mistakes, losses and complaints due to inaccurate charges. Also useful for timing the arrival and departure of rented cars, taxis, etc.

Made in several models to meet every requirement.

Write for booklet and prices.

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The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

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### The Auto Soap that Cleans and Polishes

The standard cleanser for autos and other painted or highly polished surfaces. Cleans quickly, preserves the finish, restores the lustre.

Made of pure vegetable oils—no grit, no acid, no alkali. Most jobbers have it. Money maker for dealers.

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 DAYTON, OHIO

## Pondelick Brothers

will pay **\$100**

if they fail to duplicate any part of any make of automobile or truck foreign or domestic, submitted to them. That sum will be paid to the person sending the order.

Parts of any machine can be duplicated in 1 to 3 days' notice. All welding is done at their risk. Do not compare this work or welding with that of others. If you have a broken part or parts that others cannot weld or repair, send them to Pondelick's. They increase the durability of many parts—even where the manufacturers fail.



Supply your customers with "Pondelick's" anti-leak piston rings, and you insure them against engine trouble.

They have the largest and best equipped plants in the United States for the repair or reproduction of automobile parts.

Cylinder regrinding, new piston, special casting, heat treated, Pondelick's self-adjusting, anti-leak piston rings, new wrist pin, hardened and ground, bushing made of genuine bronze, including fitting and assembling of connecting rod to piston for \$15.00.

Reputation, not competition, determines our policies. Visit our plants and be convinced. Ask anywhere or anybody about our work.

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### A TORIT WELDING OUTFIT IS A NECESSARY PART OF GARAGE EQUIPMENT.

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177 W. Third St.

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EXPERT WELDERS. ALUMINUM AND ALL METALS.

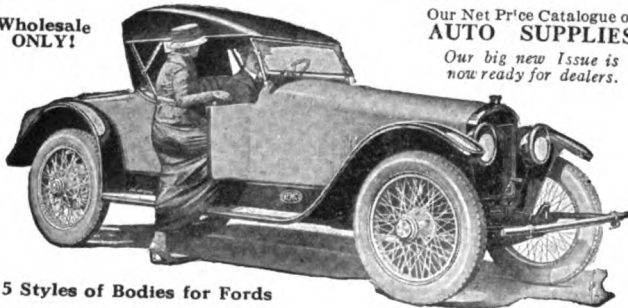
SCORED CYLINDERS HANDLED BY THE LAWRENCE PATENT PROCESS.

### Send for "The Little Salesman"

Wholesale  
ONLY!

Our Net Price Catalogue of  
AUTO SUPPLIES

Our big new Issue is  
now ready for dealers.



15 Styles of Bodies for Fords

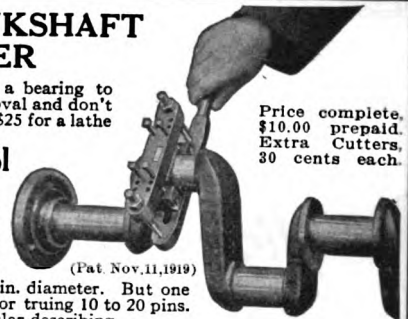
Make Money Equipping old FORDS with these classy  
"Fidelity Bodies" listed in "THE LITTLE SALESMAN" \$50 UP  
NEW ENGLAND MILLS CO., 1027 W. VanBuren St., Chicago

### ATLAS CRANKSHAFT GRINDER

Don't attempt to scrape a bearing to crank pin that has worn oval and don't pay a machine shop \$15 or \$25 for a lathe job. Use an

#### Atlas Grinding Tool

It will true up a crankshaft to less than one-thousandth of an inch in less than one hour without removing shaft from crankcase. Adjustable to all crank pins from 1 1/8 to 2 1/2 in. diameter. But one tool needed, cutters good for truing 10 to 20 pins. 5000 in use. Send for circular describing



Price complete,  
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Extra Cutters,  
30 cents each.

(Pat. Nov. 11, 1919)

#### ATLAS GARAGE UNIT

A machine for testing and straightening crankshafts, and gear press with housing assembly and piston vise attachments.

#### ATLAS MANUFACTURING COMPANY

702 N. Canal St.

Automotive Equipment

Pittsburgh, Pa.

### Best for Garage Work Graham Socket Wrenches

Known throughout the automotive industry for their unexcelled strength and reliability. Turned from the best solid bar stock and heat treated.

No. 3 Set, shown herewith, meets the needs of garages and large cars. Eight sockets and handle packed in neat canvas bag.

Get literature and dealer prices.

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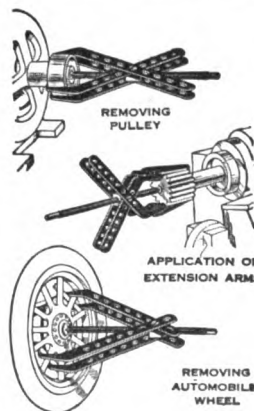
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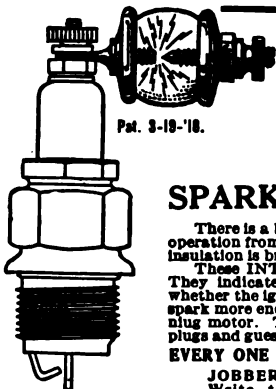
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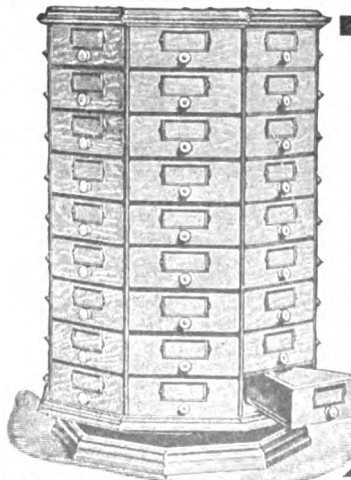
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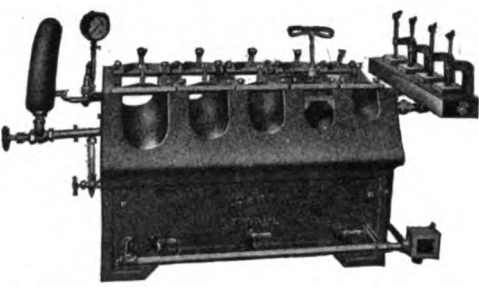




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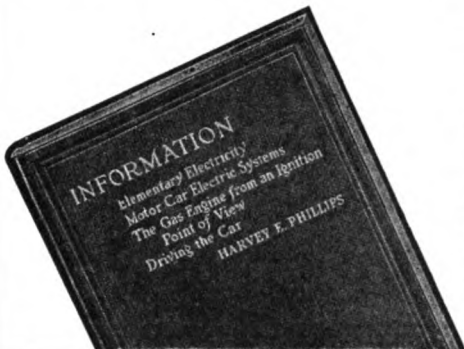


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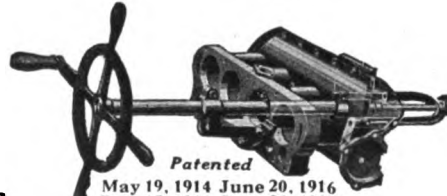
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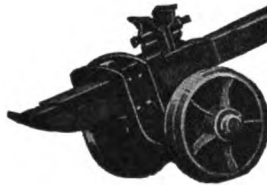


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 Champion Pneumatic Machinery Co., 1402 S. Michigan Ave., Chicago.  
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 Globe Mfg. Co., Battle Creek, Mich.  
 U. S. Air Compressor Co., 5308 Harvard Ave., Cleveland, O.

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 Lewis Tool Co., 612 5th Ave. Co., Minneapolis, Minn.  
 Marvel Machinery Co., Minneapolis, Minn.  
 Romort Mfg. Co., Oakfield, Wis.  
 St. Paul Welding & Mfg. Co., 172 West Third St., St. Paul, Minn.  
 Sawyer-Weber Tool Mfg. Co., 356 S. Alameda St., Los Angeles, Cal.  
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 Milwaukee Tank Works, Milwaukee, Wis.  
 Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.

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 Green Engineering Co., Dayton, Ohio.  
 Marvel Machinery Co., Minneapolis, Minn.

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 Burd High Compression Ring Co., Rockford, Ill.  
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 Jenkins Vulcan Spring Co., 1402 Chestnut St., St. Louis.  
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 Zinke Co., 1323 So. Michigan Ave., Chicago.

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C. A. Shaler Co., 353 Fourth St., Waupun, Wis.  
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 St. Paul Welding & Mfg. Co., 172 W. Third St., St. Paul, Minn.  
 Washburn Burner Corp., Kokomo, Ind.

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Robt. Holmes & Bro., Danville, Ill.

## WRENCHES

The Graham Roller Bearing Co., Coudersport, Pa.



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**AUTOMOBILE SPRINGS**  
 MANUFACTURERS AND SPRING SERVICE  
**GARDEN CITY SPRING WORKS**  
 2300 Archer Ave. Chicago



Champion Special Equipment K-113

## Why one large user of Air Compressors chose CHAMPIONS

The Consumers Service Stations, Inc., of Rock Island, Ill., uses over a hundred air compressors. They wanted the best so they made exhaustive engineering and service tests before buying. As a result of their experiments they use CHAMPIONS exclusively.

This air compressor will likewise serve you best. Whatever type of air outfit you need there is a CHAMPION model that will exactly fill your requirements.

**THE CHAMPION PNEUMATIC MACHINERY CO.**  
 1402 S. Michigan Ave. Chicago, Ill.

## MILWAUKEE OUTFITS for GASOLINE and OIL



**34 TYPES TO SELECT FROM**

**LABELED BY THE UNDERWRITERS LABORATORIES**

**UNDERGROUND "KANT-LEEK" TANKS - 60 TO 12000 GALLONS**

**SPECIAL PROPOSITIONS TO JOBBERS**

**WRITE TO DAY FOR CATALOG "9"**

**MILWAUKEE TANK WORKS MILWAUKEE, U.S.A.**



## Grease Guns

**R**OSE GREASE GUNS are built to put grease right where it is needed without any waste or muss. The patent tapered nozzle fits snugly into any hole from  $\frac{1}{2}$  inch to  $1\frac{1}{2}$  inches in diameter preventing grease from backing out around the nozzle.

Years ago we used to make a grease gun similar to many still selling on the market today. But we found that it did not give complete satisfaction because of this backing out of the grease. So we designed the Rose Taper Nozzle. Since then Rose Grease Guns have given perfect satisfaction wherever grease is used.

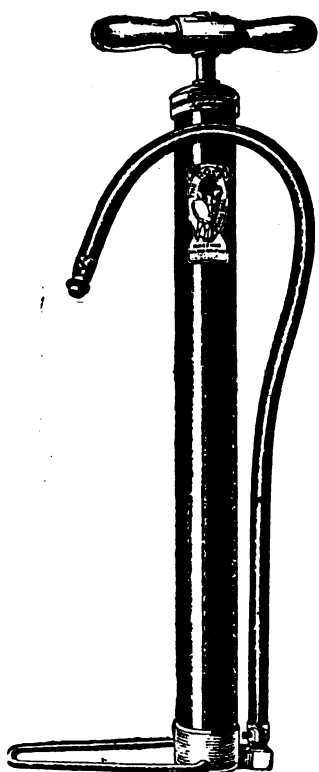
Rose Grease Guns are made in three sizes in order to suit every kind of service. The Garage and Shop gun is the largest; 24 inches long. It is equipped with handles on the sides to prevent the gun from slipping in the hand. The Truck and Tractor gun is 19 inches long and the Auto gun is 12 inches long.

You probably handle the Rose Tire Pump and feature it because you know it is the best pump made. Though Rose Grease Guns are not quite so famous they deserve your support for the same reason—they are the best grease guns made. Look them over and see the difference.



### SEE THAT TAPER NOZZLE?

It fits snugly into any opening from  $\frac{1}{2}$ " to  $1\frac{1}{2}$ " in diameter, preventing the grease from backing out. This feature makes it the handiest, cleanest grease gun on the market.



## Rose Tire Pumps

The Rose Tire Pump is the best known of all the articles in the Rose line. We have advertised it over the nation. Nearly everyone knows it and is friendly toward it.

The Rose Pump won its fame by taking the backache out of tire pumping. The patent valve makes all the difference in the world. It prevents air leakage and makes every bit of work count. Tire pumping is actually easy by comparison when you use the Rose. It was this marked difference between the Rose and other pumps that sold the 2,500,000 Rose Pumps in use today.

Folks know this pump but they don't know you carry it until you tell them so. Let them see the Rose Pump in your windows and on your counters. A little bit of advertising of this kind on your part will pep up your pump sales in a hurry.

**Frank Rose Mfg. Co.**  
Hastings, Nebr.

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Visible Dispensing Aids and Develops Salesmanship

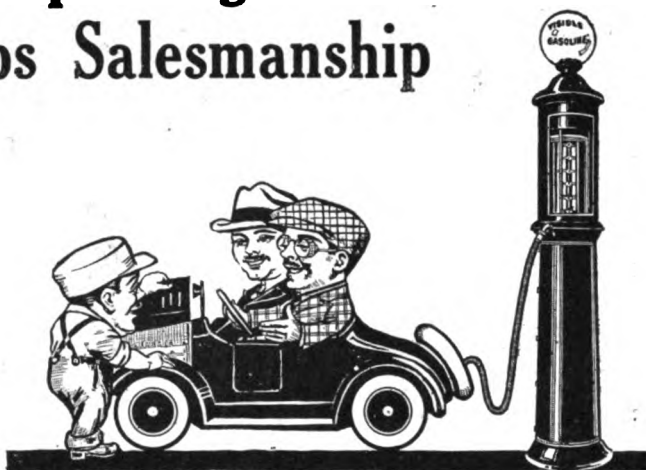


Scene: At the Blind Pump.

Customer: "What's your price on cylinder oil?"

Man at Crank: (Too busy to hear above the racket) "I tell you it **DOES** give correct measure, it was inspected only last week."

Customer: "I didn't question your pump; I only asked the price of oil—but never mind, we'll get it at the next stop."



Scene: At the Victory Visible.

Salesman (Looking over car while customer's tank is filling) "Your oil tank's pretty low; hadn't I better put in a gallon?"

Customer: "Why yes, better fill her up. Say, that see-what-you-get Pump is as good a thing for you as it is for us, isn't it?—Gives you time to make other sales."

There's a lot of difference between sweating at a crank and standing smilingly at the lever or push button of a motor-driven pump.

Self respect, to begin with; and

that's the beginning of successful salesmanship.

And the **time factor!** Pumping the 5 gallon clear glass reservoir of a

## "Victory Visible"

takes **seven seconds**. The rest of the time—while the customer's tank is filling—can be devoted to the sale of lubricants, or a quick once-over of the car to see whether it needs new tires, spark plugs or other things.

And the customer is put into a receptive mood toward you because he knows that **the pump is giving him a square deal**—and that, therefore, he is dealing with a square man.

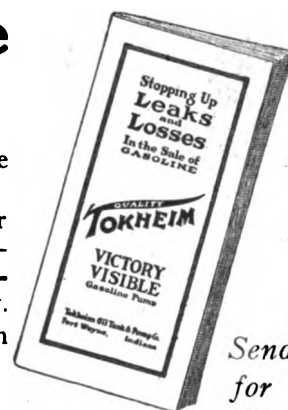
## Trade Follows The "Victory Visible"

Gasoline trade, to begin with, and other, and still more profitable, trade as a consequence.

Our customers, all over the country, write us that their gasoline trade doubled, tripled—increased 500%—as a consequence of the **good will and confidence** that **Visible Dispensing** created among the motorists of their whole community.

Send for our Book—"Stopping Up Leaks and Losses in the Sale of Gasoline"—It will open your eyes.

**Tokheim Oil Tank & Pump Company**  
Ft. Wayne - - - Indiana



Send  
for  
this  
Book





The repairman who has "tried 'em all" says  
 "There is no soldering flux like  
**NOKORODE**"

**H**E knows what kind of work it will do—how it makes those difficult jobs easy—the most delicate joints secure and how much it helps when working on these almost inaccessible parts of the car. Moreover, he knows from many an experience, that a NOKORODE soldered joint is a permanent joint.



Reg. U. S. Pat. Off.

NOKORODE has demonstrated its value on automobile work of every sort. Its features of superiority are known throughout the automobile industries—from the biggest manufacturers down to the youngster learning the repair trade.

NOKORODE flows rapidly—acts quickly—solders all metals except aluminum. It makes a smooth, non-corrosive joint. There is no kind of a soldering job that NOKORODE cannot do better than any other soldering flux.

*Write for literature and sample*

**THE M. W. DUNTON COMPANY**  
 PROVIDENCE, R. I., U. S. A.

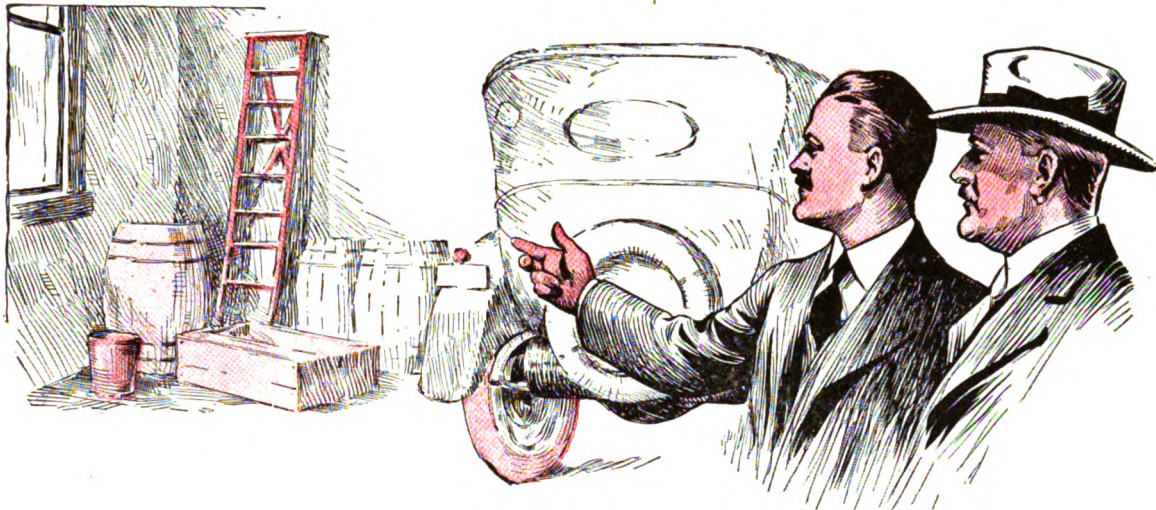


# American Garage & Auto Dealer

Published Monthly  
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CHICAGO, ILL.

OCTOBER 1920

Vol. 11—No. 10.  
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\$1.00 Per Year.



## A **SHALER** In That Corner Will Build a Big Business

Now—it's just waste space—a place for rubbish. Put a SHALER there—and it will bring in enough profits to pay for itself every week.

With the SHALER Vulcanizer you can repair 12 casings and 200 tubes a day. You know what the charge is for this work. Figure out for yourself how much money you can make!

It's easy to get business—your regular customers will give you plenty of work. You don't need experienced operators if you have a SHALER—a boy can learn to operate it.

### SHALER SHOP VULCANIZER

is the simplest, most compact vulcanizer on the market. Takes up no more room than a bicycle, and you can move it around at will. Has Automatic Heat Control, so you don't need to watch or regulate it. It's SAFE and sure—must vulcanize just right.

With a SHALER you can make any kind of a casing repair that it is practicable to make. It uses the Improved Wrapped-Tread Method—which is used by tire manufacturers—and turns out better jobs in less time than any other method. Does just as much work as large, cumbersome, immovable vulcanizers that cost five times as much and require expert operators.

The complete SHALER Vulcanizing Plant, equipped with steam heat, either with gas or gasoline burners, or for electricity, including all necessary tools and materials, and complete instructions, costs less than \$100.

### ORDER FROM YOUR JOBBER

Write your jobber, or full information regarding the SHALER Vulcanizer. Send for our Free Book, "How to Open a Tire Repair Shop" and catalog of the complete line of SHALER Vulcanizers for garages, tire repair shops and motorists' use.

C. A. SHALER CO.

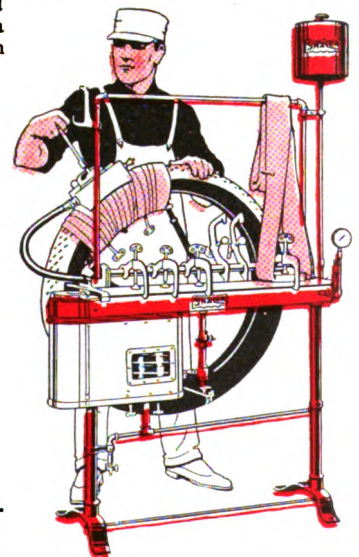
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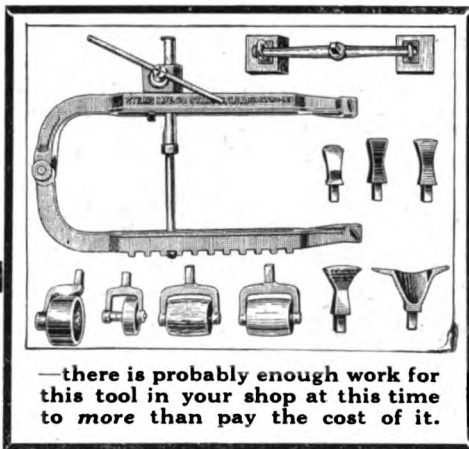
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359 Fourth St., Waupun, Wis.

*Oldest and Largest Manufacturers of Vulcanizers in the World*







—there is probably enough work for this tool in your shop at this time to more than pay the cost of it.

# —the tool with an Income

STILES ROLLS-EM-OUT FENDER STRAIGHTENER justifies its name as “the tool with an income” from the *extra* profits that can be made with it in any shop doing auto repair or service work.

In shops where bent and dented fenders are restored by the old process of hand peening and bumping this tool saves both time and labor. Does better and quicker work.

In shops that have never done fender repair work the tool opens the way to a new source of profit—without any further investment than the cost of the tool.

The principle by which STILES ROLLS-EM-OUT FENDER STRAIGHTENER *presses* out bent and dented fenders and *rolls* the metal to normal shape is based on the same principle as the arbor press known and used in every shop. It is operated by one man. Does away entirely with the old laborious process of hand peening and bumping.

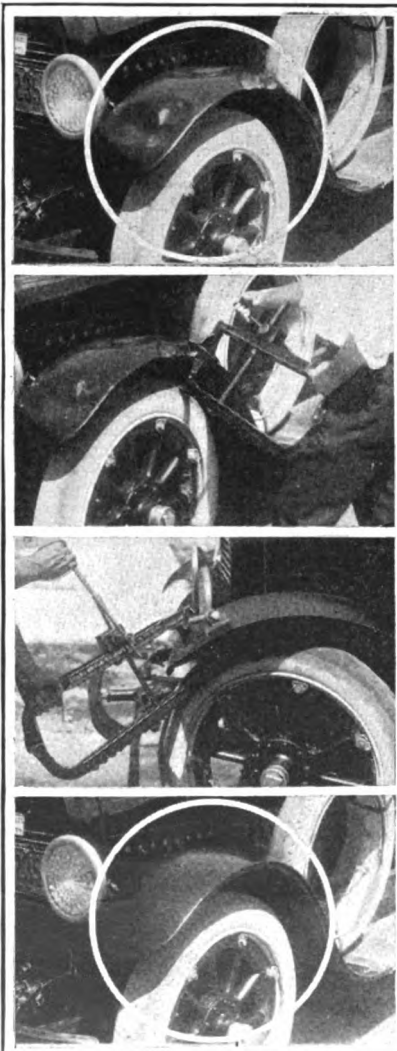
Fenders are straightened without removing from the car and without marring the enamel or finish if not previously injured.

Any shop man can use this tool. Does not require a mechanic or any particular skill or experience to operate. *Illustrated instructions with each outfit make any repair man an expert.*

**Price of Outfit Complete . . . \$40.00**

If your regular jobber does not stock STILES ROLLS-EM-OUT FENDER STRAIGHTENERS he will order one for you. Or, better still, write for name of nearest stock jobber.

**Stiles Manufacturing Company**  
ST. LOUIS U. S. A.



# A piston is only as good as its weakest point—

## There are no weak points in MARCO PISTONS

Marco pistons are the result of our observations and experience manufacturing and selling Marvel Cylinder Reboring Machines to automotive repair men in all sections of the United States—of rubbing elbows with the particular men who are making a life work of automotive repair work.

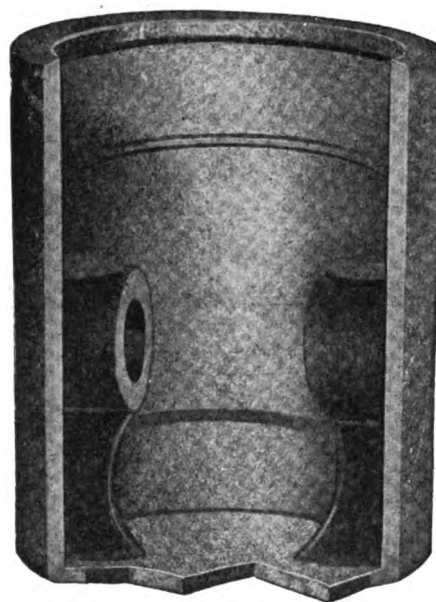
They are the result of a growing demand for pistons that will overcome piston troubles. Light in weight—substantial in construction—practical in design. There is nothing freakish or experimental about MARCO Pistons.

Marco Pistons are manufactured under our own supervision from selected grey iron of the highest quality. Every element entering into their construction—from pig iron to piston—is tested by our chemists and they are made in accordance with specifications of the Society of Automotive Engineers. Every charge in the cupola is chemically analyzed. MARCO Pistons are as much alike as two peas in the pod.

The side walls are light but substantial—they are reinforced underneath the head and around the Boss. MARCO Pistons are as light as practical, as strong as required to give excess of power, range and flexibility.

## Marco on Pistons is as Sterling on Silver

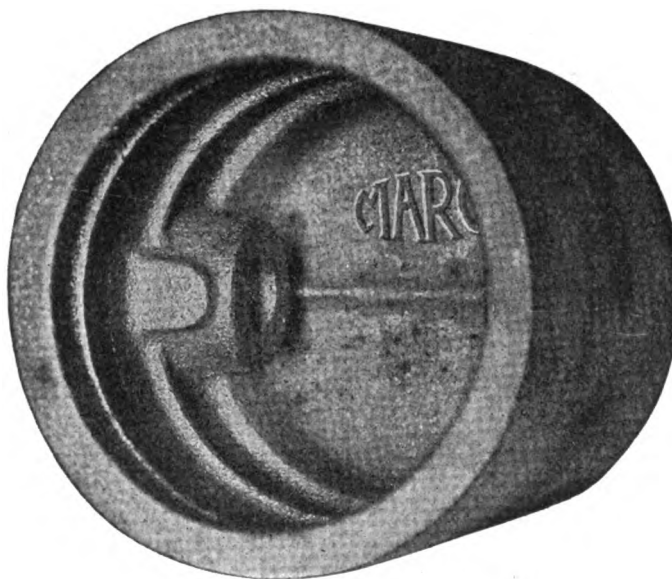
There may be other Pistons but there is only one MARCO—unapproached—unequalled. Do away with Piston troubles, use MARCO Pistons. Loss of compression, fouled spark plugs, piston slap, sticking, excessive pumping of oil are unknown with the MARCO.



## We Pride Ourselves on Marco Service

To keep pace with the increasing demand for MARCO Pistons we have recently installed new equipment and can promise MARCO users not only the highest in quality but the best in service. Castings on hand shipped the day order is received. Semi-finished and finished Pistons from two to four days. Patterns seldom called for a few days longer, but in every instance they are shipped at the very earliest moment. This unusual service is made possible by the fact that we have patterns for 2,500 makes and models of internal combustion engines—from motorcycles to trucks. MARCO Pistons are furnished in the rough, semi-finished or finished to the following standard oversizes, .020, .031, .046, .062.

Write for our latest pattern list which is indexed by sections, as Automobiles, Tractors, Stationary Engines, Marine Engines, Motorcycles, Gasoline Engines and Miscellaneous—the latter covering nearly two hundred patterns of pistons that have been made up at various times on which sufficient information has not been obtainable to permit of their classification. This section may prove a gold mine to you—perhaps it lists the exact pattern for piston that you now need.



The sign of a  
perfect piston

# MARVEL MACHINERY COMPANY

510 Loan & Trust Building  
Minneapolis, Minn.



The sign of a  
perfect piston



# "NORMA" PRECISION BALL BEARINGS (PATENTED)

Some things are so unalterably good, so inescapably essential, as successfully to resist even the cheapening effect of low-priced competition. With the passing of years, the demand steadily increases for "NORMA" Bearings—an inevitable result of the steadily increasing demand for the high-grade magnetos and lighting generators in which "NORMA" Bearings are standard.

See that your electrical apparatus is "NORMA" equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# American Garage & Auto Dealer

*Published Monthly*

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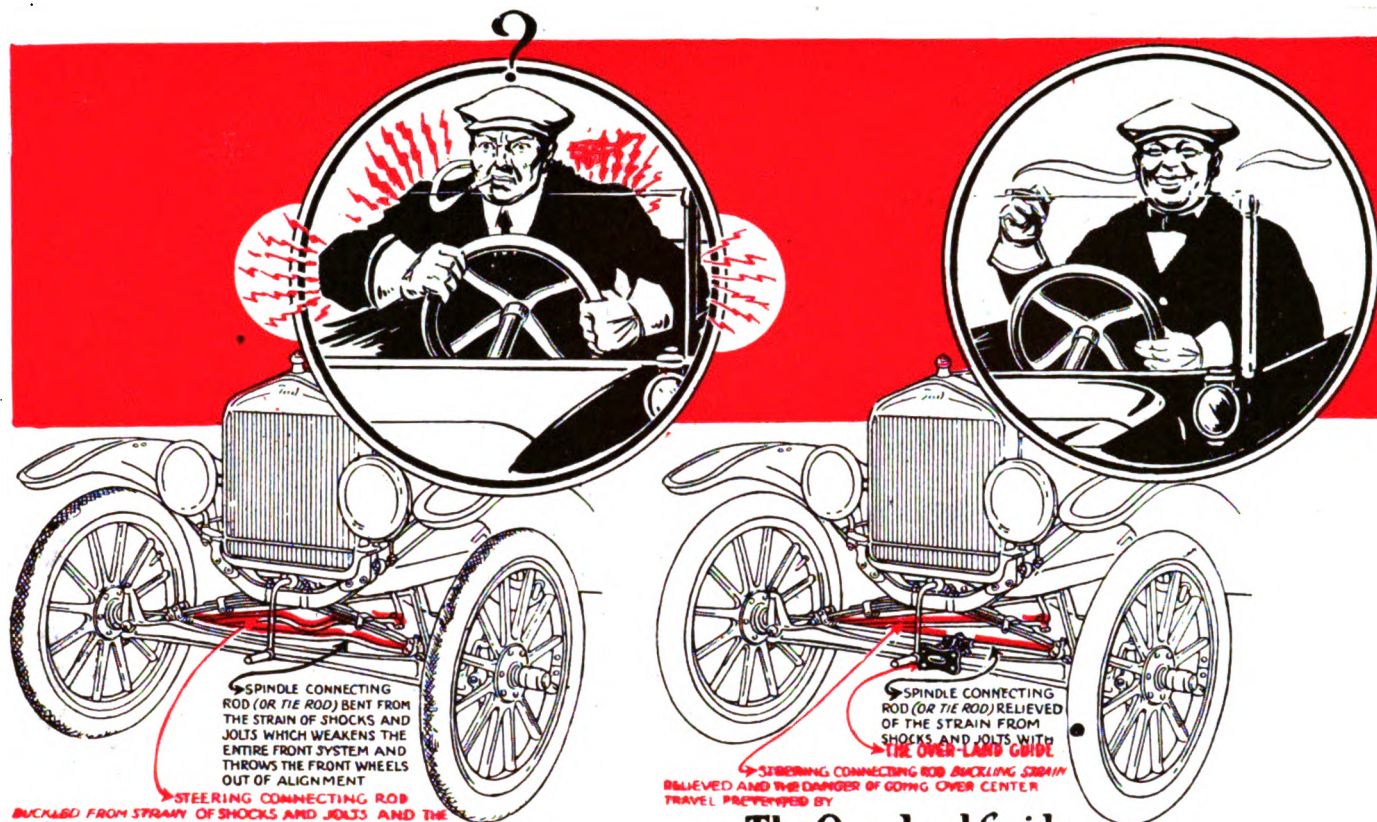
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## A Ford Controlling Itself

## The Over-land-Guide PATENTED Controlling the Ford

### To Appreciate the OVER-LAND GUIDE You Must Use It Yourself

Then you will fully appreciate the advantages afforded by it. Order one today in accordance with our guarantee printed on the right side of this page. After installing the OVER-LAND GUIDE on a Ford car or truck, give it a severe test and try-out. Drive the car over the roughest roads you can find and when you strike a hole six or seven inches deep, remove your hands from the steering wheel, regardless of the speed you are driving. Then you will realize how the OVER-LAND GUIDE controls the running of the car, absorbs all shocks, and eliminates the strain and vibration from the front system and steering mechanism.

This broad guarantee protects users of the Over-Land Guide. Send us retail price, \$8.50 and we will send you, parcel post, one Over-Land Guide. Use it 20 days, properly installed, and if at the end of that time it does not do all we claim for it, full purchase price will be refunded.

### This Wonderful Steering Shock Absorber Is a Big Money Saver

#### PREVENTS ACCIDENTS AND SAVES LIVES

The OVER-LAND GUIDE gives you the best insurance against danger of accident and destruction of your Ford car or truck through the loss of control caused by the steering connecting rod passing over center travel in short turns. The OVER-LAND GUIDE will eliminate the danger of ditching and collision with the possibility of fatal results to the occupants and the destruction of the car even though the steering mechanism be broken or fails to work. Your steering gears may get out of service, or the steering connecting rod may become locked over center travel, but the OVER-LAND GUIDE, with its grip on the rod and axle, will hold your car in the middle of the road until it is brought to a safe stop, avoiding the possibility of being ditched or destroyed.

#### PREVENTS REPAIR BILLS AND SAVES MONEY

The OVER-LAND GUIDE also reduces breakage and repairs of all the following parts—such as spindle connecting rod (or tie rod), Spindle body arms and bushings, Spindle body and bushings, Ball and roller bearings and hub, Steering connecting rod and ball joints, Steering gear drive pinion and steering gear pinions, Steering gear internal gear case and bushings. Also prevents the axle from bending—and may save your entire car from destruction with loss of life of occupants.

The OVER-LAND GUIDE removes the strain from the arms and shoulders of the driver. It gives him a degree of comfort that no Ford driver ever hoped to attain. It also stops the wobbling and scoting of the front wheels that is a continual source of annoyance.

We will ship you one parcel post for \$8.50.

**DEALERS**—When you have tested the OVER-LAND GUIDE, you will be able to sell it to your customers. Order one today and let us send you our liberal trade offer.

### THE MEIXELL COMPANY

216 Board of Trade Building, INDIANAPOLIS, IND.

Foreign Distributors—Automobile Sundries Co., 79 Walker St., New York, N. Y.



In ordering state the year your car was made.

Unlike all other STEERING DEVICES, the SPRING in the Over-Land Guide is packed in hard grease and completely enclosed, which keeps it free from dust and moisture and means indefinite service and no up-keep.

**BRUNNER**

## To Meet A Certain Condition

In the cramped quarters of oil stations—small vulcanizing shops or tire and accessory stores, the hum of gears may be objectionable. If so, a belt-driven, ultra-quiet, compressor outfit is the natural choice.

BRUNNER engineers have met this need by developing a special model.

No. 742 Motor-belt-driven assembled outfit is compact—complete, dependable and economical. Just fits the space available in a small establishment, and yet large enough to give satisfactory service in garages serving many cars a day. This is but one of the many BRUNNER models.

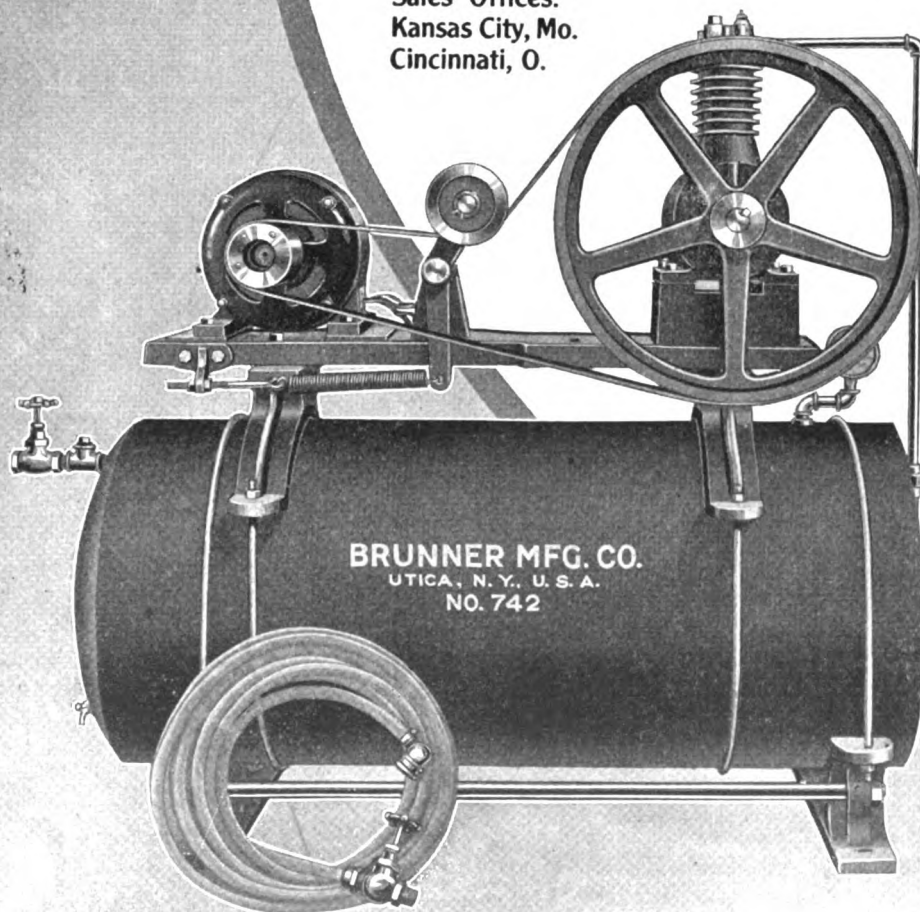
Write to-day for new catalog showing complete line of BRUNNER compressors and outfits.

### Brunner Manufacturing Company

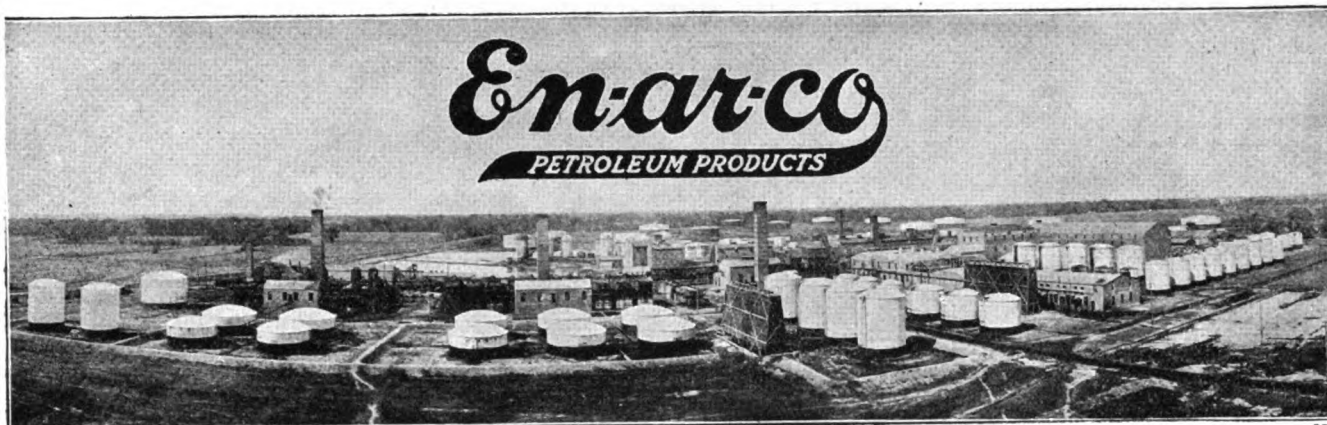
Works and Main Office, Utica, N. Y.

Sales Offices:  
Kansas City, Mo.  
Cincinnati, O.

Put your air  
problem up  
to Brunner.







## Behind EN-AR-CO Products are five great modern scientific refineries

**F**IVE great modern scientific refineries, where crude oil is refined by the most exacting and painstaking methods ever developed, are behind the En-ar-co products.

In each of these mammoth plants, crude oil is treated for the extraction of White Rose Gasoline, National Light Oil, En-ar-co motor oils and En-ar-co gear grease.

Our scientific refining methods are so thorough that in the course of a year we make over ONE MILLION TESTS by the most exacting scientific method.

This costly and exhaustive method is the secret of the superior efficiency and quality of National Refining Company products.

It insures not only their quality but their uniformity to type and specifications. Our MILLION TESTS are the guarantee to the dealer and the user of En-ar-co products.

A dealer builds his success on the quality of the goods he sells. The better the goods the larger his success and the greater the satisfaction he renders his customers.

### Dealers should write to us

Write to us today for fuller particulars about En-ar-co Products and the dealer advertising plan we offer—a plan that has been uniformly successful in getting business. Use the coupon.

**THE NATIONAL REFINING COMPANY**  
2155 Rose Building Cleveland, Ohio

THE NATIONAL  
REFINING  
COMPANY

2155 Rose Building  
Cleveland, Ohio

Please send me particulars  
about your plan for EN-AR-CO  
dealers and other information  
about your products.

Name .....

Address .....

City .....

I now handle .....

# EXTRA PROFITS for TIRE-DOH DEALERS



We are going to make it worth your while to handle the genuine TIRE-DOH in 1921 and to push it for all you're worth.

We believe that 1921 will be the biggest business year we have ever had and are planning accordingly.

## TIRE-DOH

now has over a million users and the number is constantly growing. We are enlarging our manufacturing facilities and our channels of distribution to take care of this increased demand.

TIRE-DOH is a rapid, steady seller because it enjoys the confidence of the motoring public. It is not only the oldest and best tire repair outfit but the only one you can sell with the assurance that it will make satisfactory repairs.

TIRE-DOH mends anything that is rubber—tubes, casings, hot water bottles, rubber boots, etc.—there is no tear or cut that TIRE-DOH cannot mend effectually and make like new.

### This is the time to sell TIRE-DOH

People are saving and cutting expenses. Motorists are only too glad to reduce the upkeep on their cars. TIRE-DOH has for years proved a consistent seller regardless of conditions.

And in 1921, we are going to make it doubly worth while for dealers to handle TIRE-DOH. We have a special proposition that will make you sit up and take action.

Write for it today—using attached coupon.

#### COUPON

**Atlas Auto  
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680 W. Austin Ave.,  
Chicago, U. S. A.

Please send me your  
Extra Profit Proposition on  
TIRE-DOH.

Name.....

Address.....

Our Jobber is.....

**Atlas Auto Supply Co.**

680 W. Austin Ave.

Chicago, U. S. A.



# American Garage & Auto Dealer

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## It's a "Buyer's Market" Now.

The past few weeks have been anxious ones for the automotive industry. It began when Henry Ford announced reduction in prices to pre-war levels. Other automobile manufacturers followed and one large accessory dealer has announced a 20 per cent reduction in retail prices. A few automobile manufacturers have advanced prices, while others have stated that no reductions can be made and that purchasers will be protected against declines up to April 1, 1921, and some even to July 1, 1921.

September certainly was a month of decisive price cutting, not only in the automotive field, but in other lines as well. The price of cotton dropped about 45 per cent, and the cotton drop was followed by a 30 per cent cut in lumber.

It was expected that steel would drop, but leading steel manufacturers assert that prices are low and no reductions will be made. However, there is a drop in demand for steel for automobiles, ship-building, and new construction generally and the steel mills are catching up on back orders. In view of conditions, it would not be at all surprising if there will later be a reduction in steel prices.

With decreases in employment reported from industrial centers, and reports of increasing efficiency of labor, there is a consequent reduction in the cost of producing materials. The railroads are now moving more freight than ever before and consequently, commodities which have been

withheld from the markets for months are relieving the general shortage of materials.

Since September 1 there has been a decided improvement in general business conditions and the opinion is prevalent that we are safely making the descent from the abnormally high price levels.

The expected change from the "seller's" to the "buyer's" market, referred to in the September issue of the AMERICAN GARAGE & AUTO DEALER, has now taken place. The day is past when if a dealer had goods, someone came and took them away, paying the price asked without kick or comment. Service and salesmanship and improved business methods and management furnish the pass key for the future.

Use of this pass key will enable all automotive dealers to dispose of present inventories and continue to successfully operate under the new conditions imposed by the change to a "buyer's" market.

## Efficiency in Gasolene Production.

There has been much talk of a gasolene shortage and many were the pessimistic predictions made. It was pointed out in the AMERICAN GARAGE & AUTO DEALER that while consumption had been greater than production, there was no basis for the gloomy reports circulated in many newspapers as to the situation.

That this position was fundamentally sound is shown by the fact that the latest figures indicate a crude oil

production at a rate of 575 million barrels as against 377 million barrels last year. Oil from Mexico is coming in at the rate of 100 million barrels, almost double that of last year.

Another gasolene gloom disperser is the announcement just made by the United States Bureau of Mines that 300 million gallons of gasolene that is now wasted each year through evaporation in transportation, can be saved.

This saving, according to J. C. Lewis, petroleum technologist of the bureau, will be sufficient to keep 1,200,000 automobiles in service. Details of the discovery, it is stated, will be communicated to the oil operators in the near future with suggestions as to the remedy.

The Bureau of Mines recently investigated conditions in the oil fields and found that about 20 per cent of the gasolene in crude oil goes into the air. Losses through evaporation of gasolene from crude petroleum occur from the time the petroleum leaves the wells until it arrives at the refineries. These reach a total of more than 600 million gallons—and half of this amount, it is asserted, can be saved.

The worst feature of the losses is that the gasolene wasted is the most volatile and, consequently, the best quality of gasolene that is obtainable. The prevention of this, which is economically possible, would not only increase the gasolene supply, but would increase the general standard of the fuel.

"The methods of handling crude oil

in the field have grown up from the time when gasoline was a drug on the market and there was consequently no incentive for conserving it," said Mr. Lewis. "Until recently no one stopped to consider whether the methods devised for conditions 20 or 30 years ago are satisfactory for today."

It is indeed comforting to everyone in the automotive industry to learn that the Bureau of Mines is placing information at the disposal of the oil companies to save gasoline which formerly escaped into the air and benefited no one. The oil producers are already taking active steps to eliminate the wastes and thus add to the annual supply.

#### Trucks and Roads.

The Department of Agriculture, summarizing the experience of 831 Corn-Belt farmers who own motor trucks, found that in the opinion of nine-tenths of the men, the greatest advantage in owning a motor truck is saving time. In the opinions of three-fourths of them, the greatest disadvantage is poor roads.

Farmers have found that trucks, as compared with horses and wagons, save about two-thirds of the time required for hauling between the farms and market.

On the average, the trucks of the 831 farmers travel 2,777 miles per year and the cost of operation is between 16½ and 17 cents per mile, making the total annual cost from \$460 to \$470.

Each truck displaces an average of 1.2 head of work-stock. With the cost of keeping a horse a year in the Corn Belt around \$200, the reduction in expense for this item is in the neighborhood of \$240 per farm. For all farms the average amount of hired help saved by the trucks is \$163. Custom hauling done with trucks amounts to about \$50 per year for all farms.

The saving of time to the truck owners and members of the farmer's family, the ability to get crops and livestock to market in better condition or at better time, and other bene-

fits, are not measureable in dollars and cents.

But if trucks are to operate at full efficiency, good roads are a necessity—for there are over eight weeks during the year when the roads are in such a condition, on account of mud, and snow that these trucks cannot be used.

"America should have good roads; she should have better roads; and finally she should have the best roads in the world."

The motor truck takes its place today as the vital factor in short-haul transportations. It has been a power in the development of our country. It is bringing farming communities within reach of the best markets.

And the road to market must be one that can be easily traveled.

#### Making the "Blind Dealer" See.

Two good eyes alone are hardly sufficient to guide a dealer in the management of his business. Although his sight may be perfect still he may be as blind as a bat, so far as knowledge is concerned about things most vital to his success.

We hear much these days about the "shelf-warmer," the "sticker," and the merchandise that no one wants, but almost always it is the "blind man" in business who is burdened with such problems as these. The dealer who knows what he is doing because he has clear insight into everything that takes place, is able to avoid such bugbears as these. He discovers their presence so quickly they have little opportunity to cause him much trouble or losses.

All he requires in getting the facts he needs, are accurate figure records, and good judgment in acting when his figures show him what to do. He can tell quickly when a particular brand of merchandise begins to slow down in sales. If he fails to make it profitable by the usual methods of stimulation, such as proper display, advertising and personal salesmanship, he knows that it belongs to the "sticker" class.

If the article proves to be something for which no demand can be created, that information is very important to him. When he buys again, he will not duplicate the poor seller, but will substitute for it that which his records show him his customers want and which will make money for him. In this way he increases his turnover, keeps his stock fresh and always on the move, so far as it is possible.

Speaking of turnovers—let us settle just what is meant by this term "turnover." Whenever an article is sold at a profit, the capital invested in it has been turned once. That may be once a day, once a week or once a year. Some lines move faster than others. To measure the rate of turnover for any given line or article, divide total sales for the year at cost price by the average investment in those goods at cost price.

Suppose \$1,250 of each year's receipts represent the sale of some particular line, the cost of which was \$750. This gives a gross profit of 40 per cent of the sales. The average stock carried of this line is \$500 at cost. Then the year's turnover in this line is \$750 divided by \$500, or 1½ times.

Allowing 25 per cent for expenses, leaves a net profit of 15 per cent for the year, or 10 per cent on each turn. If the stock could be made to turn three times a year, a net profit of 30 per cent would be realized within the year. Furthermore, every other turnover that could be forced out of this line would mean an additional profit.

It readily can be seen then that many small profits are more desirable than a few large ones. A \$10,000 stock turned eight times a year with a profit of \$1,000 at each turn is a much better proposition than a \$15,000 stock turned only four times with the same profit at each turn.

It plainly is evident then that the dealer who knows what to do and when to do it, is the one who has the least to worry about and the best prospects for success.

# Sounding the Personal Note in Business

The New Tendency to Emphasize and Advertise Personality of Specialists in Automotive Work—A Big Drawing Card for Employers—A Boost to Prestige of Employees—Instills Confidence on Part of Customers

By K. H. Lansing

There seems to be a tendency, especially in some small and middle-sized towns, to emphasize the personality of specialists in the automotive and allied trades, as well as in other lines.

Employers, who have taken great pains and been to considerable expense to obtain the services of an expert in a particular line, or some phase of their business, want to tell the world that this man is adept in his field, both as a matter of pride and as a means of advertising that his kind of a job will be done in the most workmanlike manner for the patrons of the establishment.

Of course, the man thus advertised has no objections. He realizes that this sort of advertising increases his prestige in the trade and makes a name for himself at his employer's expense. Should he plan to embark later in business for himself, this kind of publicity is usually sure of giving him a running start.

Then, too, the patron has a greater feeling of security and satisfaction, in many cases, if he is assured by the guarantee of the house that it has a man, either performing the work himself, or directly supervising it, who has a reputation of which his employer is proud.

Whether this "boosting" of any one man in a business is wise, especially if the man is an employe among numerous others, is a question to be worked out by each employer.

The wisdom of the step depends largely on the disposition and character of the man so employed. If he is conceited, overbearing, or rattle-brained, the publicity thus derived may do him more harm than good and be reflected in unwarranted demands for higher pay from time to time and a tendency to look down upon, if not to appear contemptuous of, his fellow workmen.

But ordinarily, a man who has brains enough to make a reputation for himself, in the first place, through concentration on his work, has enough sense to keep from spoiling his own job by a case of "swelled head."

There are cases on record where

sounding the personal note for an employe apparently has done both the employer's business and the man himself a lot of good, but in these instances the employe thus advertised had a level head and a fair sense of

## S & R Tire Retreading Co.

### RETREADING and VULCANIZING

Department is under sole supervision of A. O. Loewy, formerly with Monmouth Rubber Works.

404 EMORY ST. Tel. Asbury 1355

Loewy's Work—Drawing Card for Business.

proportion, understanding just what this publicity meant to himself and his employer.

Such a man is apt to strive to sustain the reputation that is being established for him, to do all he can to prove what is said about him and to make him live right up to the top-notch of efficiency.

The management of a certain well-known chain of cigar stores under-



Vulcanizing and Retreading Department of the S. & R. Company.

stood this principle when it decided to post daily, in plain view of the customers, the names of the salesmen, in charge for the day, and his assistants.

What applies to the employe, applies also, to a certain extent, to the "boosting" of one, of two, or more, partners in a business. A notable instance of where "boosting" has been proved worth while, is seen in the vulcanizing trade in Asbury Park, N. J.

A. O. Loewy, of that place, has been associated with the tire sales and vulcanizing business for 15 years and naturally has acquired, in that time, a valuable store of knowledge of the trade in all its kinks and twists. He has specialized on the vulcanizing end, until his acquaintances declare he can go through all the processes "blind-folded."

Whether that is mere "kidding," or not, Loewy, after putting in a good, long period with the Sterling Tire Corp., of Rutherford, N. J., became associated with the Monmouth Rubber Works, in Asbury Park. Here his work became so well known that different concerns began to compete for his services.

After a while, the S & R Tire Retreading Co., of 404 Emory street, Asbury Park, secured him. The company realized that Loewy's work had become known all through Monmouth county, and even outside of it, because of the large number of tourists to the seaside resort who had come to count on his personal ministrations to their ailing tires. So it was decided to make Loewy's expert work the big drawing card for business.

The company forthwith began advertising Loewy. In virtually all the bigger dailies in Monmouth county, it uses display advertisements, two inches long, by one inch wide, in bold-face, surrounded by a border.

These advertisements announce that Loewy is sole supervisor of the department devoted to retreading and vulcanizing. They bring business—Loewy's local reputation brings it, too. The company not only admits it, but is boastfully glad about it.

The company has another important department—that of tire and accessory sales. Harry Simburg is in charge. He is one of the proprietors,

but he doesn't care to be "boosted," for, as he says, he isn't an acknowledged expert in any particular line, who would be sure to bring business to the company simply through the use of his name in advertising.

There is no business jealousy in a case like this—simply common sense.

Physically, the business is not large. It might be described as more intensive than extensive as regards the space it occupies. Every bit of floor and most of every wall are utilized to the best advantage—and even part of the outdoors. Each department is a model of neatness and efficient arrangement.

In the vulcanizing and retreading department there is the following equipment:

A table with galvanized iron top, for trimming and tearing-down treads.

Table for building-up and cementing.

**"Andy" Gallagher** is now in personal charge of all our vulcanizing and repair work, and will be pleased to serve his numerous old customers in the same faithful manner as heretofore.

**Vulcanizing**

**Goodyear Service Station**

**Consumers Auto Tire Repair Co.**

522 Linden Street

Another Example of the Personal Note.

A metal tank for testing tubes for leaks.

A buffing machine run by electric power.

Work benches ranged along one wall, each beneath a window. These benches are equipped each with a drawer and the usual outfit of small bench tools, with garage vise, and mandrels to support tires and tubes.

A four-cavity sectional mould. Vulcanizing is done by means of steam.

A retreader, which takes care of tires from three to five inches.

Tire spreader for opening casings.

Tube plate.

Tread-roller mounted on a stand.

Rack for fabric, equipped with three rollers, each for a different kind of fabric.

Tread bank for treads and sections used in repairing.

Air compressor for inflating tubes.

The order of work in this shop is arranged in sequence to pass the tire brought in for repairs along to the waiting service car for delivery, with the minimum expenditure of time. The tire when brought in is taken to the tearing-down table and trimmed.

Following the processes at this table, it is passed quickly to the building-up table and, when necessary, the tube then goes to the tube plate.

The tire is then vulcanized, thoroughly cleaned of all process shreds and taken to the waiting Ford service car, which is used for both deliveries and "pick-ups."

Where the job is not a "hurry-up" one, the tire is coated on the sections, both outside and in, with a good grade of black paint, after having been thoroughly cleaned.

It undergoes this process in what Loewy calls the "summer garden"—something novel in vulcanizing shop practice.

This is really an outdoor shop, directly in the rear of the shop proper. Against the wall is an extra workbench, just outside the rear door. This is supplied with vise, mandrel, drawer and small tools, like the inside shop benches. At one side is a huge bin used for storage of tire and tube scrap, and opposite is a tall rack for old tire sections to be used again.

Soiled and muddy tires are cleaned out here, and general rough work, in addition to painting, is performed in this place in summer. It is a great convenience, as it keeps the main shop tidy and virtually dust-free.

In front of the main vulcanizing



Vulcanizer Reproduces Expert's Picture.

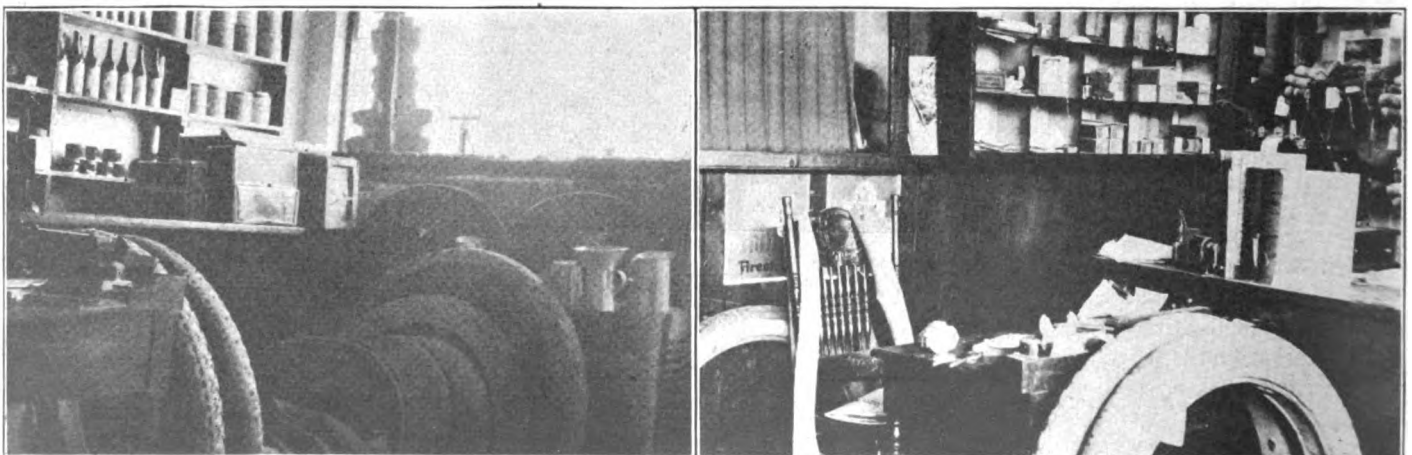
shop is the salesroom, where tires, tubes, spark-plugs, small parts for automobiles—especially Fords—general automotive equipment, and oils and greases are merchandised.

No foolish amount of space is taken up here for the sake of the doubtful dignity of an office. The "office" consists of a tiny desk and chair, just outside the counter and near the door leading into the vulcanizing and retreading department. The end of the counter nearest the desk furnishes room for a few letter files and books.

The company carries \$3,000 worth of new tires, arranged neatly in racks, nearly that amount in old tires, kept in the basement and in the "summer garden" and approximately \$1,000 worth of general accessories, parts, oils and greases. Free air is supplied to customers.

The walls of the salesroom are lined with neatly-arranged bins and wall cases containing the varied stocks. Oil, in 50-gallon cans, is kept in this department, so that customers need not be kept waiting any longer than is necessary. There is a large,

(Concluded on page 16.)



Views of Neat Stock Bins and Wall Cases and a Glimpse of the Tiny "Office" in the Midst of Things.



# Employers' Liability for Street Hazards

Employers Cannot Be Held for Employees' Injuries Received in Public Streets Where There Is Normal Risk for Everyone—They Can Be Held for Injuries Where Employment Increases the Normal Street Hazard of Employee

By Chesla C. Sherlock

Compensation, as we have pointed out in previous discussions, is payable for injuries resulting from accidents "arising out of and in the course of" the employment. The employer's liability is based upon the happening of an accident which injures the workman so that he is incapacitated from carrying on his trade or occupation. And, under the compensation acts, the employer's liability does not extend one step farther.

The question that becomes of supreme importance, then is: Just what sort of accidents are deemed to have "arisen out of and in the course of" the employment? Suppose a workman is injured while on his way to the toilet. Is that an accident "arising out of and in the course of" the employment? Suppose that the workman is injured while on his way to or from work. Is that a compensable accident?

The questions arising from injuries received while on the way to the toilet will be treated in a subsequent discussion, but the greatest interest attaches to the question of street hazards and the employer's liability therefor.

It will be remembered that the theory underlying the compensation acts is that since the hazardous nature of the employment increases the workman's risk from injury that the employment ought to compensate the workman, once it causes his injury. The theory is that the workman, by reason of his employment, is subjected to a greater risk than anyone else in the vicinity. Since the employment is directly responsible for his loss, then we look to the employer, rather than to some third person for relief when injury takes place.

If a given work or employment is hazardous, the hazard is present in greatest degree to those engaged in the work. Other persons may live in the immediate vicinity and never be subjected to any great risk from that work. The test of liability, then, is always whether the employment increases the hazard of injury to the particular workmen over and above

the normal hazards experienced by everyone in the community.

Some states go so far as to limit recovery under the compensation acts only to workmen who are engaged in so-called "hazardous" occupations, occupations of greater hazard or power to injure, than those commonly experienced by others in the community.

In the case of street hazards—that is the liability of a workman to injury while going to and from work—we must apply this test to the case. Does the employment in which the injured workman is engaged increase his hazard or risk of injury while using the streets in going to and coming from his employer's place of business?

There is a normal risk of injury

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**Books are indeed like friends, but the volumes in a man's technical library are more; they are not only friends, but dear counsellors and advisors, helpers upon whose aid and wisdom a man can rely; their presence makes him rich; their loss no weight of gold can replace; they are partners whose mouths speak for him with the adversary at the gate.—John Phillips.**

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on the streets to which every person using them is subjected. Since this is what the courts call a "risk of the commonalty"—one common to all—it is obvious that it would be unfair and beside the plain intent of the workmen's compensation acts, to hold that an employer should be the insurer of his employee's person while subjected to a mere risk common to all.

The ordinary rule, then, is that the employer cannot be held for injuries received while using the public streets, where such injuries are not due to the employment but are merely due to the common street hazard which everyone is subjected to in the course of the day.

There is an exception to this rule and one that is worthy of note. It is quite commonly held by the courts, and properly so, that if the employment is such that it increases the normal street hazard of the workman,

then the employer may be charged with liability and the workman entitled to receive compensation for the injuries caused.

A case in point was where, by reason of the employment, a stenographer was required to go around by the postoffice each morning on her way to work by her employer and get the morning mail. It was shown that this took her several blocks out of the way and made it necessary for her to cross several railroad tracks in order to get back to the employer's office, a thing she would not have to do had she not been required by him to get the mail.

In crossing the tracks one morning, she was run over and severely injured. The court awarded compensation on the theory that the employment had increased the normal street hazard and was, therefore, liable for the injury.

In the case of garage employes, this exception to the general rule may be of great moment. If men in the shop are required to take cars out on the streets in order to test them, or adjust them, in making repairs, and are injured while so doing, it is quite likely that their employers will be held liable for the payment of compensation.

An employe may be guilty of flagrant abuses of common sense while so using the streets and highways and the employer will still be liable. The fact that he drives the car at a high rate of speed, will not be sufficient to deprive him of compensation, in case of injury.

Employers must keep in mind that compensation is not payable on a basis of fault, as were damages under the common law, but that they are payable on a basis of accidental injury arising out of and in the course of the employment.

Since garage owners are peculiarly liable to street hazards in such cases, the duty devolves upon them to put in practice and to enforce rules for the conduct of shopmen and repairmen, while upon the streets and highways, which will serve to minimize chances of injury and loss.

# Height of Serviceableness in Garages

When Kresteller & Stewart Built Their New Sales-Service Station and Garage in San Francisco, They Included All Innovations That Past Experience Proved to Be Desirable—They Have the Wherewithal for Big Business

By C. W. Geiger

Kresteller & Stewart, authorized Ford dealers, have recently completed a combined sales, service station and garage at Market St. and Doloras St., San Francisco, Calif., which embodies many new and novel features. The entire plant was designed by Kresteller & Stewart, who have included all innovations that past experience has proved to be desirable, and have excluded all features that past experience has shown to be undesirable.

Advantage has been taken of a hillside at Market, Doloras and 14th Sts. The building is of reinforced concrete throughout, and has a very pleasing appearance, both within and without. It has a frontage of 147 ft. on Market St., 316 ft. on Doloras St., and 147 on Market St.

A large room on Market St. is devoted to the salesroom for Ford cars. The building is two stories and contains approximately 46,000 square ft. of floor space. There is an entrance from Doloras St. directly into the service department, which extends for a distance of 260 ft. along Doloras, and is 50 feet in width. Between the salesroom and the service station are the various offices of the concern.

The floor of the salesroom is of red cement and the walls are finished in imitation tile, with imitation masonry ceiling calcimined to match the walls.

The entire salesroom is finished in French gray and cream.

The machine shop is 50 ft. in width and 200 ft. in length, paralleling the service station. There is a public ga-

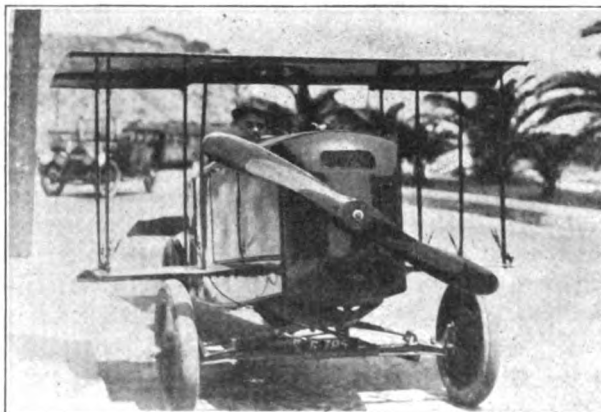
the engines of cars undergoing repairs.

There is an overhead air pipe with three air connections placed at a height of about 8 feet above the floor as shown in one of the illustrations. There is also an air drill suspended by a cable. How this method aids the operator in handling the air drill is indicated in another of the illustrations.

This plant has been equipped with labor-saving machinery of all kinds, enabling repairs to be made in much less time than was previously required. There is a special re-babbiting machine which slides back and forth on a steel track accommodating two blocks at one time. A wooden table carries the metal track. The air and

gas leads are connected to pipes under ground.

There is also a reboring machine; crankshaft straightener, and camshaft straightener combined; a special permanent rack for holding crank cases; a permanent and portable crankcase straightener, and a crankcase holder which is portable. There is also a special table for machine work, special transmission-band lining machine, 20-ton hand press, burning-in and working-out machine, welding equipment, which is portable, crankcase holders, special transmission rack for holding transmission gears, and drill press accommodating the rolling



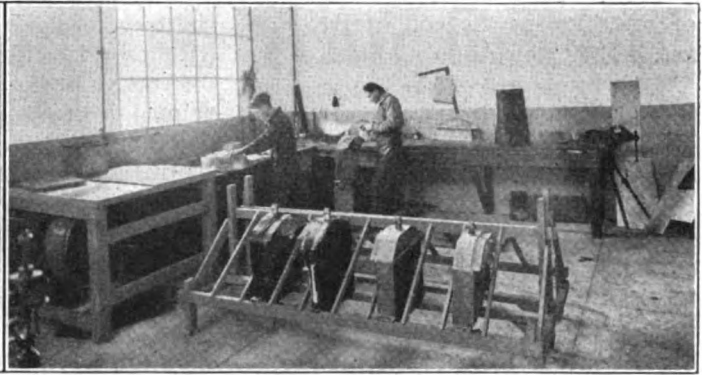
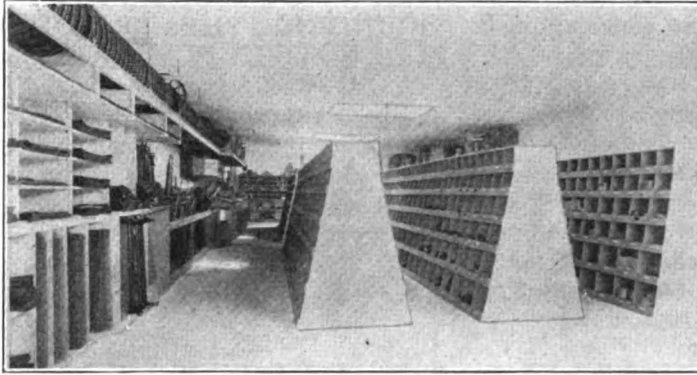
The Unique Stunt and Advertising Car Creates a Sensation.

rage which occupies the entire basement under the service station and the machine shop, with an entrance opening directly on 14th St. Here oil, air, water, and gasoline are provided. There is a well-planned stockroom, 30 ft. by 90 ft., which is arranged with a window opening into the service station and another opening into the machine shop.

In the machine shop there is a two-cylinder air compressor operated by a 5 h. p. electric motor which supplies air for the following purposes: Operating air riveters, air drills, air wrench and for automobile tires. Air and distillate is also used in cleaning



Before and After: The First Establishment Was a Very Modest One—The Second Is Both Imposing and Impressive.



Three Pyramids Six Feet in Height in the Stockroom Contain 2,000 Bins for Parts—A Glimpse of the Radiator and Fender Department.

operation for refinishing cylinder walls after the block has been re-bored.

The radiator and fender department occupies a section of the shop 25 feet square. There are two special portable racks for holding radiators before they are repaired, after they are repaired, and after they are painted. Each of these racks has the capacity for holding 10 radiators.

In the machine shop, there is an overhead trolley system for handling heavy parts, which is provided with a number of chain hoists. The trolley extends down the center of the shop for 160 feet and the two trolleys are 40 feet apart.

The stockroom has a number of unusual features, among which are three pyramids, 6 feet in height, containing 2,000 bins for parts. All parts are arranged numerically which greatly facilitate the finding of anything that may be desired. A wire screen divides the right bins from the left bins which results in cleanliness, and permits the light to reach the interior of the bins.

Along one side of the stockroom, there are arranged 500 bins which are devoted entirely to large parts such as wheels, axles, glass, steering

wheels, tires, etc. In the rear of the bins, there is a large section which is devoted exclusively to storing bolts and nuts. There are three skylights

ORIGINAL

**VERBAL ORDERS DON'T GO**  
USE THIS FORM FOR COMMUNICATING WITH  
OTHER DEPARTMENTS

Job No. 1091 Date Aug 10 1920  
Mr. Chas Berch

Deliver car  
to Peoples Dairy  
at 1 PM today

# 2437651

No 102965 Signed W. Prestelle

No Parts Are Taken Out on a Verbal Order. of wire-glass. These combined with the large windows at the front of the storeroom, provide an abundance of light.

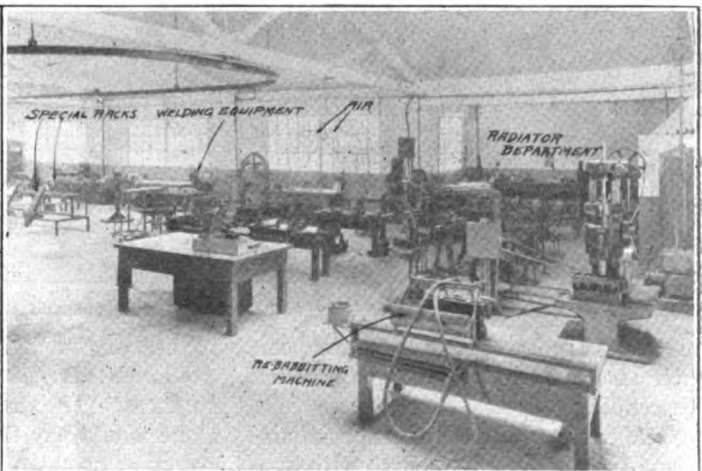
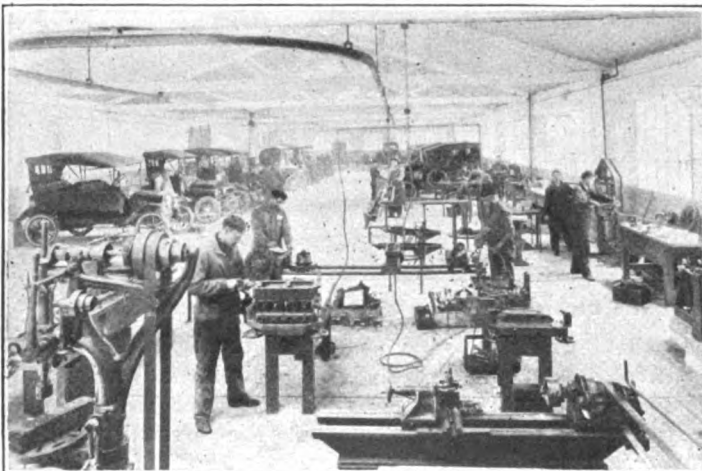
In the far right-hand corner of the stockroom is a mezzanine section devoted to accessories such as speedometers, shock absorbers, tool boxes, and inner tubes. From \$1,500 to

\$2,000 worth of tires are carried in stock in special overhead racks. These are for replacing worn out tires and for the retail trade.

No parts are permitted to be taken out of the stockroom on a verbal order; a requisition from the shop foreman or superintendent is always required. No mechanic is permitted to do work unless he has a verbal order form.

There are four fire doors between the service department and the machine shop, which are arranged on overhead tracks in such a manner that they are shut at all times. This is done for the protection of the customers. There is also a fuse on each of the other doors so that in case of fire, the fuse will melt and the doors will be automatically closed. Even the windows between the stockroom and the service room and the machine room are provided with fuses so that they will automatically close in case of fire.

The service department has accommodations for storing 200 cars. A special air hose that is rather novel has been provided on an overhead reel in this department. Ordinarily the reel is held by a chain and two springs, but when it is desired to fill a tire, the



The Great Machine Shop With Its Complete Repair Equipment Is a Sunshine Department for the Workers.

operator grasps the end of the hose and pulls it down into position.

Just inside the main entrance in the service department is the electrical department. Here it is possible to make every electrical repair on a Ford car. At the left of the board is the generator-testing outfit. There is also an armature-testing apparatus; coil-testing and recharging equipment; equipment for recharging magnetos in and out of cars.

The board is equipped for testing for short-circuits of all kinds, and for making tests on self-starters. The board is also equipped with automatic release in case of shortage of wire, as a safety measure. Beneath the board are two drawers, one small drawer for small parts and a large drawer for tools.

The walls of the building are practically solid windows, as there are nearly 5,000 sheets of glass in the building.

One of the employes of the plant recently built an airplane body on a Ford chassis which is used by Kresteller & Stewart as a stunt and advertising car. It is a two-seater and is built exactly on the lines of an airplane, being provided with propeller, which can be operated by the engine if desired. The rudder is connected with the steering gear by means of cables in such a way that the rudder turns from right to left when the steering wheel is manipulated, thus acting as a direction indicator to the drivers in the rear. The machine is also equipped with the regulation airplane elevators, which are connected with the control lever, and act the same as in an ordinary plane. When the car is brought to a standstill the

cial tread in the rear, which are made to conform with the narrowness of the body toward the rear. It is painted a cream yellow. There are port and starboard lights, which are controlled by a regular lighting switch.

Needless to say, this car creates a sensation when driven through the streets of San Francisco and immediately attracts a large crowd of spectators when it stops.

### The Effect of Road Surfaces on Tires Faces Public.

It is estimated that 28,000,000 tires are now necessary yearly to equip the passenger automobiles and motor trucks in use in the United States. To this should be added at least 12,000,000 tires for vehicles which accumulate mileage to such an extent that they require a second set.

The annual expenditure for tires and inner tubes at an average cost of \$25 is estimated at \$1,000,000,000.

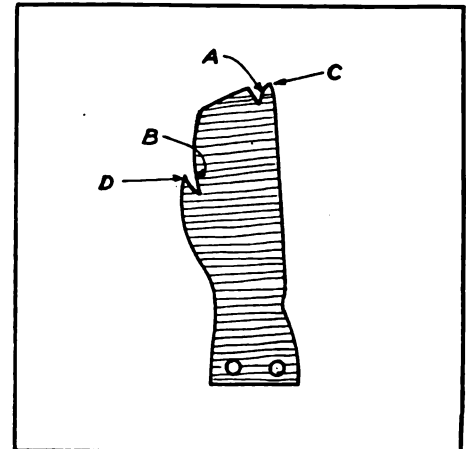
"More attention should be paid to the effect of the various road surfaces on the motor vehicle instead of considering only the damage by the motor vehicle to the road," says M. O. Eldridge, director of roads of the American Automobile Association.

"Few of those who discuss transportation questions," says Mr. Eldridge, "give thought to the fact that our 7,000,000 motor cars which require annually 28,000,000 tires, exclusive of renewals, create a problem, namely, how fast will these tires wear out on each type of road surface? Compare, for instance, the smooth surface of Fifth Avenue with the rough, gritty, and flinty surfaces so often encountered on country

### SOUNDING THE PERSONAL NOTE IN BUSINESS.

(Concluded from page 12.)

neatly-dressed show window, showing not too many but just enough samples of stocks to arouse and sustain interest in those who are passing by.

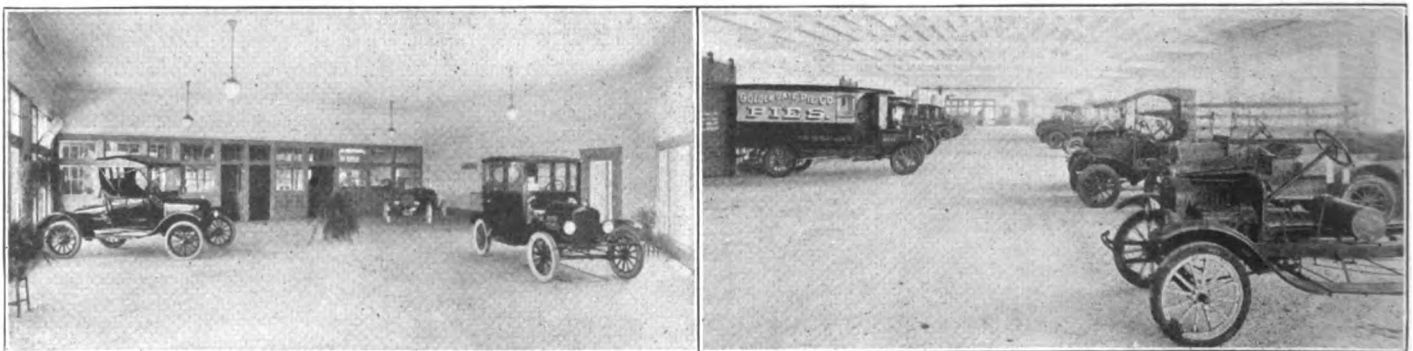


Loewy Has Made a Special Fabric Knife.

This window display is changed frequently and always is seasonable.

Loewy now and then puts his ingenuity to work in spare time, to make the repairshop work easier. For instance, he has fashioned out of an ordinary cutting knife, one that will cut exactly one and two plies of fabric, and any number. To make the cutting of exactly one ply and two plies at a time, Loewy notched the knife in his own way. When he used the notch to cut one ply, it cannot slip and cut two, and when the two-ply notch is used, it will cut just two plies and no more. With the opposite edge he can cut several plies at once.

Loewy's method, after cutting through the plies with the knife, is to pull away with the pliers the piece thus loosened.



The Attractive "Gray and Cream" Salesroom and the Service Department Where 200 Cars Can Be Stored.

elevators are lowered in the same position as the elevators on a plane when descending.

The car is equipped with special airplane tires 26 ins. by 4 ins., with spe-

cial tread in the rear, which are made to conform with the narrowness of the body toward the rear. It is painted a cream yellow. There are port and starboard lights, which are controlled by a regular lighting switch. Needless to say, this car creates a sensation when driven through the streets of San Francisco and immediately attracts a large crowd of spectators when it stops.

A sample of the S & R Tire Retreading Co.'s display advertisements is reproduced together with samples of "sounding-the-personal-note" in other towns.



# "Make It Snappie But Use Your Beene"

Customers Like to Have Servis When They Come Along—They Like to See a Feller Act as if He Had Sum Pep Not Sleepin Sickniss, But Just Rushing Around and Not Getting Ennywhere Don't Give Servis—Use Your Beene

By Frank Farrington

Deer Pete.

You probly thought I got fired diddent you? Nope Ive bin on my vacashun. I was cummin to old Pinkville but Bob sed "Youll be ded enuf when you get back without spending your vacashun in a ded town," and he giv me a letter to his ant that keeps a boarding hous down to atlantik citty and she let me board for haf price and I ate dubbel at that. So I diddent hav time to rite enny letter down there, but I spose you got my soove-neer post card of the oshun and that aint gone dry yet.

Say Pete, if youd go down to atlantik citty for a vacashun youd get so waked up youd never get to slepe agen and buleve me if you want to get enny ideeahs about running a bizness rite youll haf to stick your nose out of Pinkvill as much as once a yeer ennyway. If you cant do enny better, cum over heer to Pike City and youll find out sum things all rite.

Bob says that a feller that dont never go outside of his old home town and look around a littel gets so he thinks the drummers and tourists is lying to him when they tell him about sum garaje sumwhere thats better than his. And he says that a feller that never goze enny place else gets kind of haf wittid thinking about nuthing but what he can see on the rode from the hous to the garaje and back agen. Ile say heez rite. Ime that way—not haf wittid I dont mean, but I think like Bob does.

If you think Ime goin to rite all about what I saw on the board walk down there on my vacashun your thinkers runnin on too leen a mixcher. I got enuf of that board walk croud in one day. Sum gang. More diffrunt kinds of fokes than youd see

in Pinkvill in a yeer, leep yeer at that. All of em thinking about their cloze or about sum guy with jack to burn or about their complexshuns or about sum daim or about sumthing to eet.

Part of the time I went in swimmin but buleve me it was sum diffrunt from the old Pinkvill swimmin hole. Ile say so. The water wassent so wet and a lot of thoze ladie swimmers I gess had on soots they was afrade wood shrink or sumthing if

their sines and the pumps and the door handels and the window glass and I watched to see if they did it every day and they did purty near. Say Pete, how often do you wash your windows? I dont wash ours moren once a week and I gess I never polisht our sine and if the boss shoold see me touchin up the gas pump with red paint heed drop ded. Aint it so?

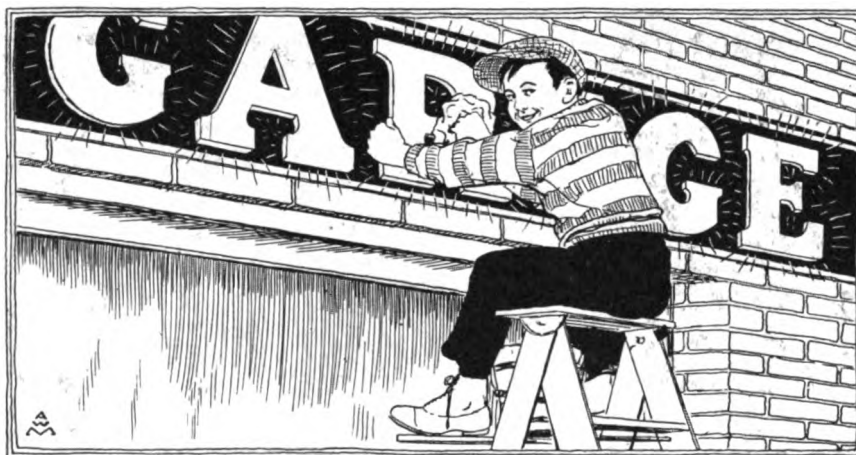
When I saw how slick and shiney sum fellers kept their places I thought

there must be sum s p e s h u l expensiv way of doing it and I talkt to a feller and I found out that all there was to making em look so foxy was just elbo grees and I gess Ive got plenty of that and since Ive got back Ive made our sine shine sum, Ile say I hav, and Bob says the boss is afrade Ime going to ware out the plate glass in the frunt

before the price of glass gets down where he can afford to buy sum new. But buleve me Pete, the frunt of our garaje looks sum diffrunt. It looks like a millyun dollers. I admit it.

I'e bet a new 2 sents peece agenst the hole town of Pinkvill that if youd use a littel elbo grees and mebbly a littel gold paint or sumthing on the sines in frunt of your place, the boss wood go rite by when he cums down tomorro morning becaws he woodent recognize the outfit. You just look over the sines in frunt of your drug store and along your street and see if most of em aint all mildood or turnin green or sumthing. Why lots of em are that way even heer in Pike City and Pike Citys got it all over Pinkvill like a circus tent.

Another thing I notist about sum of those garajes down to atlantik citty and that was how snappy their fokes was. Say, I thought Bob and Josey and even Chick and Persy was quite



All There Is to Makin Sines Look Foxy Is Elbo Grease. I've Got Plenty of That.

they got em damp but there wassent enny danger becaws they was like the girl that hung her cloze on a hickory lim and diddent go neer the water.

But a lot of the time I went around and looked over the garajes and looked at their windows and the way they had things fixt and I notist one thing I haddent notist even in Pike City and that was that those swel garaje fellers all had their sines and all the brass fixins around out in frunt all polisht up and you diddent see enny gas pumps that was kind of dinjy. They was all as red as a bran new one and redder. Enny kind of a bras nob wood shine like the diemond ring Dazie got at the doller limnit store. I meen the dollers the limnit, not the ring. At leest Bob says if it aint a diemond Dazies stuck a doller.

Every morning when Ide get around erly enuf Ide see fellers polishin up

snappy when a good customer showed up but take it from me, Pete, weer asleep at the swich. Ile say we are.

When I wood see a limmuzene role up in frunt of one of those live garajes I cood see the feller handling the curb bizness wood cum to atten-shun in frunt of the customers snappy as a shavetale when a majergenerul g'es by. Of course sum garajes wassent that way but I meen the clas-siest ones that did the most bizness.

Ime going to get our bunch working more snappy but I dont kno how be-caws Ime afrade theyll get mad if I say ennything, but I can see that cus-tomers like to hav servis when they cum along and they like to see a feller act as if he had sum pep not as if he was just took down with the sleeping sickness.

Our fellers is on the job all rite, all but Persy, but when I saw what regular snap was, I saw we diddent hav it. I gess Ile ask the boss if he cares if I put up a sine in the offis and one in the shop where the fellers can see it but not where the cus-tomers can. I want it where Dazie, our ex-quisit stenogra-fer, can get an eyefull of it once too. Sheez gettin her ate hours of work and her ate hours of sleep all mixt up and Ime afrade sheez goin to be late gettin around to the tango parlor sum nite.

The sine wood read MORE PEI' PLEEZ or sumthing like that. Gee Ile haf to get a moov on myself be-fore I put up that sine or theyll hav the laf on me. But say Pete Ime the guy that put the pep in peppermint and Ile show em how to step lively.

Now dont get me rong on this Pete. I dont meen that a feller ought to be rushing around all the time like a chickin thats had its skypeece ampu-tated. Just rushing around and not getting ennywhere aint going to make fokes think youre giving em servis. Theyll more likely think youre crazy. I meen actin quick when sumboddy

drives up, getting to em as soon as you can, and if you cant get to em just then, tell em youll be there in a second.

When a customers in a hurry heez in a hurry and he dont want to haf to stand and lissen while you or sum other feller make a bet on the ball game or while you and sum other rummy try to tell each other the big-gest stories about the milej on an old tire.

Make it snappie, but use your beene. Thats my mottoe Pete. Ime that way. Rite soon to

Youre snappie frend, BILL.

### "Push the Call Bell for Gasolene Service."

At the Dickerman garage, East Troy, Wis., the motorist finds an elec-

to such matters until someone makes their need known. Many motorists content themselves with operating their horn until the noise of it attracts attention, but if a motor is running in the shop, the sound of a horn out in front will not be heard.

"We considered it a good stunt to install a loud bell in our shop and connect both pumps with it. Our men are under orders to stop work at once and answer the call. Motorists seem to appreciate the plan. Someone commends us for it almost every day."

### Motors Supplanting Swiss Railroads—Transportation Affected.

According to Swiss railway authori-ties, there has been a decrease almost to the vanishing point of first class and even second class railway traveling; and it is proposed to abolish first class carriages alto-gether except in the case of inter-national sleeping car trains.

The constant rise in railway fares has caused 94.64 per cent of travelers to go third class in Switzerland so that less than 5½ per cent travel first and second class. Those who can afford to do so now travel by motor car and generally take their luggage with them. Not only do the Swiss do this, but numbers of tourists likewise.

Goods traffic as well as passenger traffic is affected. Already the motor van service, although carried on pri-vately and not fully organized, is a very formidable rival of the railways for the conveyance of heavy goods, and all the more so because the vans can deliver goods straight to or carry them straight from a factory, shop or private house, which the railway can-not. Even the Swiss post is not so much used as formerly because many firms with very large correspondence deliver many of their letters and par-cels by motor bicycle.



The Gasolene Call Bell Has Won the Appreciation of All the Shop's Customers.

tric call bell on each of the two side-walk pumps in front of the place. A push of the button brings a prompt response from those at work in the shop at the rear of the building.

Mr. Dickerson has this to say about the arrangement in question: "We suppose someone else must have thought of this plan beside ourselves, but we have never seen or heard of any other. As it stands, it represents our own idea.

"We have found, when motoring around the country ourselves, that the gasolene wants of the tourist are poorly met in most small-town ga-rages. As a rule, everyone is busy in the shop and no attention is given

# The Storage Battery and Its Care

The Construction of the Lead-Plate Storage Battery—Action Which Takes Place in a Cell—Hydrometer and Its Use—Charge and Discharge—Observance of Directions Will Eliminate Great Dark Mysteries—First Installment

By R. H. Kasper

There is no piece of apparatus in common use today which is so generally misunderstood as the storage battery. This lack of knowledge is, perhaps, the cause of much of the abuse which the battery receives, and as a battery suffers more from abuse than from use, dissatisfaction is the inevitable result. The battery of today has a particularly rugged constitution, and if given a minimum of care, it will give a maximum of service.

The most prevailing impression places the storage battery in the same category as the water reservoir. True, the battery is the reservoir of the electrical system, supplying current at command, but it differs from the reservoir of the water supply system in a radical manner.

Water is stored as water in the reservoir, but electricity is not stored as electricity in the storage cell. Instead, the passing of the charging current through the cell produces a chemical effect, and this chemical action may be reversed to produce an electric current.

## Battery Construction.

Owing to its greater adaptability for starting purposes, the lead battery is most generally used today. It consists of a certain number of cells connected in series, according to the voltage desired. From an elementary standpoint, the individual cell consists of a jar or container, generally of rubber, a group of positive and negative plates, known as the elements, separators for insulating the plates from each other, and a solution of sulphuric acid or electrolyte.

The plates are alloy grids pasted with

an active material, which in the positives is red lead and in the negatives, yellow lead or litharge. This active material is thoroughly kneaded into various shaped pockets in the grids; the pasted plates are placed under a tremendous pressure, after which they are thoroughly dried or baked in an oven.

The plates then undergo what is known as the forming process. This consists in charging them in a weak solution of electrolyte until they are thoroughly corroded. The positive plates now consist of lead peroxide and are dark brown in color, while the negatives have been changed to lead sulphate and are of a whitish-gray. This forming process, besides corroding the plates, has eliminated all impurities in the lead and pasting.

The plates are then thoroughly washed and dried and are burned together into groups. A positive group consists of a certain number of positive plates connected to a suitable strap while the negatives are formed in the same manner. The negative group, however, generally has one more plate than a positive group for the same size cell.

The number and size of the positive plates determine the capacity of the cell, and it is, therefore, desirable to have every square-inch area of positive plate equally acted upon. The extra negative plate facilitates this arrangement, allowing the groups to be slipped together with each positive plate between two negatives.

The separators are generally of wood, treated so as to remove all wood acids, and are ribbed so as to permit a free pas-

sage of the electrolyte to all parts of the plates. Where rubber separators are used, they are perforated for the same reason.

The electrolyte consists of a solution of sulphuric acid and water. The sulphuric acid is that made from sulphur and is practically free of impurities.

The groups are now assembled, with the necessary separators between, placed in the jars, the right density of electrolyte is added, and we have our storage cell ready for the initial charge.

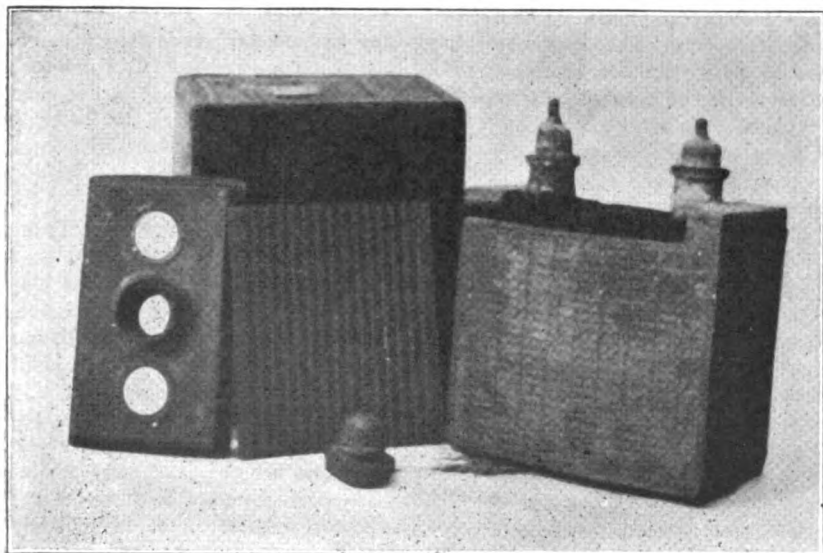
## Action In a Cell.

The impression seems to be general that, as in a water reservoir, any amount of electricity may be poured into a storage cell. This, however, is not the case.

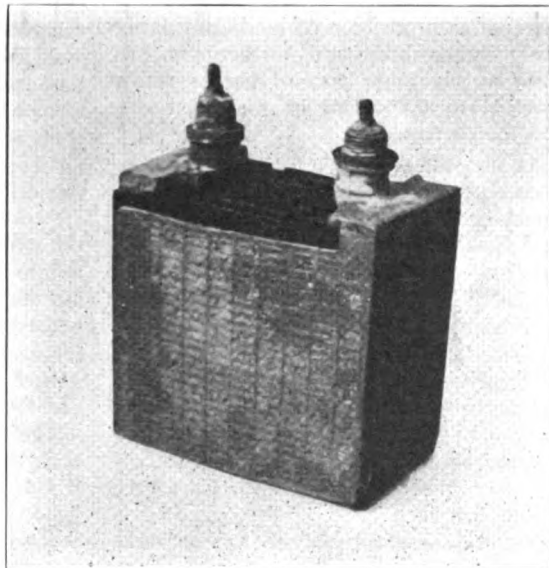
The charging current simply changes the physical composition of the two sets of plates, establishing a difference of potential or voltage between them, which in a fully charged battery is about 2.2 volts. When an electrical connection is made between the two sets of plates, as in discharging, a reverse chemical action takes place and a flow of current is the result.

Suppose we immerse two platinum wires, separated from each other, in a glass of salt water. If a source of current is applied, the water will be decomposed into its two component parts, namely oxygen and hydrogen. Bubbles of oxygen will be formed and will cling around the wire where the current enters the cell, while hydrogen will form around the other.

If the source of current is disconnected and the wires are attached to a very sensitive electrical measuring instrument, the



Storage Cell Dismantled, Jar, Cover, Filling Plug, Separator and Elements.



Positive and Negative Group with Separators Between.

bubbles of oxygen and hydrogen will re-enter the solution as water, and a feeble flow of current will be the result.

It will be seen in our crude storage cell that the flow of a charging current has caused a chemical re-action, which upon being reversed, produced a flow of current.

Replace the platinum wires with two lead strips and use a solution of sulphuric acid instead of salt water, and again connect our source of charging current. The water will again be decomposed into oxygen and hydrogen. But the oxygen, instead of being liberated in the form of bubbles at the strip where the current enters the cell, will combine with the lead strip and change it to a low state of lead oxide.

If charging is continued long enough, the positive strip will attain a light brown color, while the negative will become a light slate. If the source of charge be disconnected and our cell discharged as before, a flow of current will again be noted.

The oxygen, which combined with the lead strip to form lead oxide, re-enters the solution and when current no longer will flow, the two strips have returned to their original state of metallic lead. The discharge current, in both experiments, will have been found to have flown in the opposite direction from the charging current.

The two lead strips in the glass of acidulated water formed a perfect storage battery, though a very inefficient one. The positive and negative strips or plates of the cell had attained but a slight degree of corrosion, and though capable of producing a difference of potential of about two volts, the current output was necessarily very low due to the restricted plate area and the imperfect formation. By repeated chargings and dischargings, the lead strips would have been corroded to an appreciable depth, but the process would have been a long and tedious one.

The pasting of alloy grids with a certain physical composition of lead eliminates this tedious process and, furthermore, exposes an enormous area of porous active material to the action of the electrolyte and the current.

As the voltage of a storage cell depends upon the composition of the elements and the electrolyte used, all storage cells of the lead type have the same voltage (2.2), regardless of the size of the plates or their number. But the size of the plates and their number have a direct effect upon the current capacity, amperes delivered; the more plate area exposed to the action of the electrolyte and the current, the greater the output of the cell. The lead strip cell differed only from the commercial battery of today in being able to deliver but a very feeble current.

We will now consider the action of a more efficient battery, one in which the pasted plates have already attained some

degree of corrosion owing to the forming process.

### The Charge.

As soon as a charge is started, the sulphuric acid is decomposed into sulphuric oxide and hydrogen. The sulphuric oxide travels against the current to the positive plates, and having a very powerful oxidizing influence, immediately attacks the positive plates, changing them to a peroxide of lead. The positives are now of a dark brown or chocolate color and are very hard.

The hydrogen has traveled with the current to the negative plates, and displacing the metal in the layer of sulphate on the plates, has changed them to a spongy lead. The negatives are now of a slate color and the pasting may easily be marked with the finger nail. The electrolyte of the cell has a density of about 1.300, while the voltage is about 2.2 volts. The cell is now in a fully charged condition.

As the active material of the positives has attained as high a degree of oxidation as is possible, and the negatives are soft and porous in their sulphated state, no amount of further charging will increase the capacity of the cell. The capacity is determined by the maker, and as it depends upon the amount of active material exposed to the action of the electrolyte and current, any attempt to increase the capacity of the cell by overcharging is both useless and detrimental.

When there is no longer any material in the plates with which the elements of the solution can combine, the cell has reached as high a state of charge as is possible. Overcharging will only tend to raise the temperature of the cell, cause excessive gassing and evaporation of the electrolyte, and will cause the active material to crumble and, in time, drop from the pockets of the grids.

### The Discharge

When the battery is called upon to deliver current, the chemical action of charging is reversed. The sulphuric acid attacks the particles of spongy lead in the negative plates, forming a sulphate of lead and liberating hydrogen. The hydrogen ions travel to the positive plates, changing them by degrees to a sulphated condition. Both sets of plates thus become of a sulphated condition and the voltage of the cell drops.

As long as any lead peroxide remains on the positive plates and spongy lead on the negatives, a difference of potential of about 2 volts will be found between them. But when both sets of plates are practically of the same degree of sulphation, the battery is in a discharged condition and no appreciable amount of current will flow.

The density of the electrolyte has also undergone a change, dropping from a density of 1.300 at the charged state to about 1.150 when the cell is discharged. The acid in the electrolyte has combined with the active material, filling its pores with sulphate.

Acid and lead combine with each other in a definite proportion in producing current, and it would be possible to have both the acid and the lead in a cell of such quantities that both would be exhausted at the end of a discharge.

Towards the end of a discharge, however, the electrolyte would be so weak as to be unable to produce a current for any practical purpose, and therefore the acid exceeds that actually used in the plates during discharge. Similarly, if all the active material were combined with acid, the plates would lose their porosity and conductivity, and a slight excess of lead would be provided.

The slight excess of both acid and lead at the end of the discharge, therefore, facilitates a more ready flow of current and is also an aid in lessening the resistance to the flow of a recharging current.

When a current is sent through a discharged cell, the plates are gradually restored to their original condition and the acid is returned to the electrolyte. As the degree of sulphation of both sets of plates decreases, the density of the electrolyte rises in proportion, and when both sets of plates have again reached their original state, the density of the electrolyte has attained its maximum.

As long as the cells are functioning normally, the same changes in plate composition and acid density will go on indefinitely. The density of the electrolyte is determined by the maker of the battery, and as there is no loss of acid under normal conditions, none should ever be added to the cell. Water alone is lost by evaporation and therefore only pure water should be added to replace that loss. The flushing or replacing of evaporation with electrolyte is a common and most harmful mistake.

The electrolyte does not lose its density under normal conditions and does not require replenishing, and therefore, the addition of acid only results in forming a higher electrolytic density, causing an excess of sulphation and doing injury to the cell. And furthermore, it renders unreliable any hydrometer readings, giving a false impression of the battery's condition. The density of the electrolyte is the only true and reliable indication of the battery's health and it should not be tampered with.

*(To be Concluded.)*

### Fleets of Automobiles Keep Telephone Lines Working.

According to a recent survey by the National Automobile Chamber of Commerce, thousands of cars and trucks are being used to carry voices from point to point in the telephone world.

Every telephone company has its passenger vehicles for supervising work. These cars which are usually roadsters or runabouts, are often equipped with tool boxes so that minor repairs can be immediately handled. Trucks are used extensively for heavy repair work and new construction.



# Giving the Old Car an Overhauling

Bill Decided if Overhauling and Repainting an Old Car Was a Money-Making Proposition for Other Folks, It Was a Good One for Him—He Went to Work—Now He Is Disclosing Some Pet Secrets on the Overhauling of Cars

By J. N. Bagley

"How much is my old car worth to you today, just as she stands and me to keep my spotlight and tools," inquired Bill Smith of his local dealer as his old car rolled alongside the new six-cylinder touring car that had been unloaded just a few hours previous and was receiving its finishing touches before being taken to the show-rooms, which, of course, is necessary as they come with a number of the necessary parts either in boxes or attached in a suitable package.

"Most any price you will ask, if you will just shut off the darned old trap before I get a case of nervous prostration and swallow a lot of the tacks that I have in my mouth," returned the dealer with a smile, while he continued to place a tack here and there about the car's upholstery.

"That is a mighty classy job, Hank, and I would like to drive her home with me, and will, providing you speak up a little on

the price of this old bus of mine, for I don't intend to give her to you by a long shot. You remember you gave me a skinning the last time I traded with you and I intend to keep my eye on you this time,

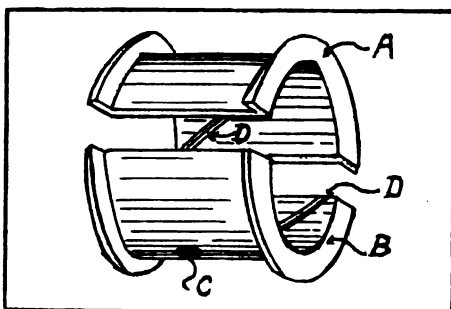


Fig. 2—The Die Cast Bearing Can Be Replaced at Will.

Hank, to see that I don't make any donations, especially after just spending a nice little sum for new clothes for the wife and kiddies," remarked Bill, as he drew a cigar from Hank's pocket and lighted it.

Hank continued to drive tacks and place a screw here and there, while Bill vigorously pulled away at the cigar and looked the car over. Bill tried hard to show no particular interest, but Hank was one of the live, wide-awake fellows and was watching Bill out of the corner of his eye, so as to know just about how much he was interested in a deal.

"This is the last carload at the old price," said Hank, as he began to gather up a few tools that were scattered about on the running board of the car. "Now, Bill, I can save you a little money if you want to talk business, and I will give you the car at the old price and allow you every dollar your old car is worth."

"Very well, Hank, that is the way to talk, and if you have a proposition to make that means anything to me, I am ready to listen to it. Speak up, and we will have the argument over, for, I must go out to the farm and take some nails to the contractors."

"All right, Bill; I can tell you how I'll trade in about three minutes," returned Hank, taking a paper and pencil from his pocket and jotting down a few figures. "To begin with, your engine is in very bad condition and must have a thorough overhauling before it will be in shape to turn again.

"Your transmission needs taking down and new gaskets placed to stop that waste of grease which you see working out around the case. Your brakes are badly

worn; in fact they will have to be relined and readjusted, in addition to a hundred little minor things that take an endless amount of time, to say nothing of the expense.

"Another thing that must be considered in this instance, Bill, is the paint on the car. You couldn't expect to do much with it without first giving it a coat of paint, and the top, look at it! It will require a new covering and possibly a new lining, as it is very doubtful if that old one can be dyed to an advantage. All this would total—let me see—" Hank figured while Bill helped himself to another of Hank's perfectly good cigars, and after lighting it took his position behind the wheel of the new six to see how the starter worked.

"\$245 is the very best that it is possible to do on your old bus in the condition she is," began Hank, eying Bill closely.

"Thunder and mud!" shrieked Bill, letting his mouth fly open so quickly that he lost the cigar that he had just lighted. "Must be some scales on me some place, as you seem to take me for a fish," he commented, as he scrambled out from behind the wheel and closed the car door with a slam.

"You will have to peddle that car to some one else. I'll drive my old boat awhile just as she is." Bill pulled his old

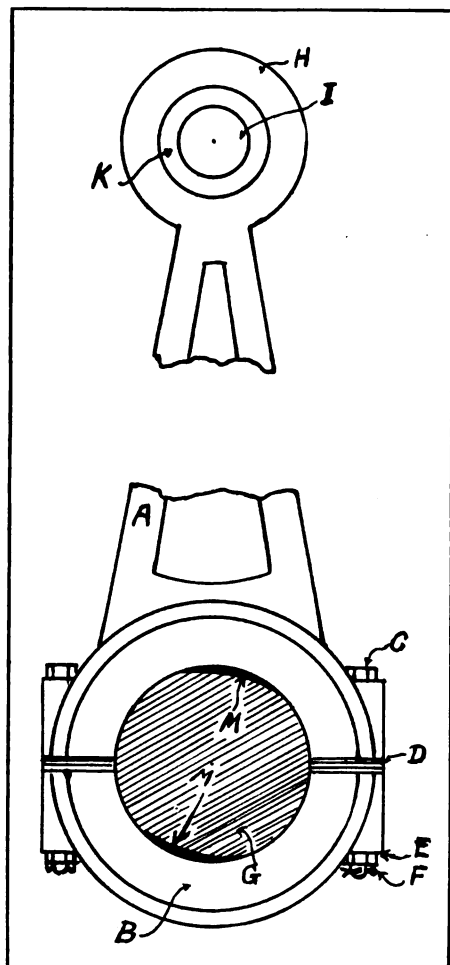


Fig. 1—A Connecting Rod of the Most Common Type.

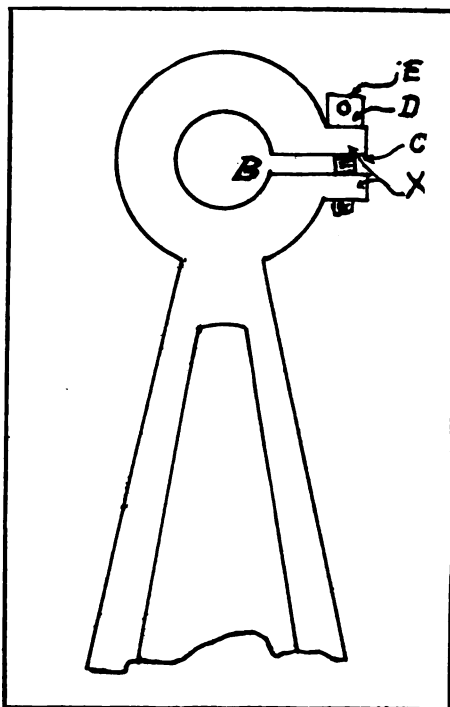


Fig. 3—Type Connecting Rod Generally Used—Upper End Has No Bearing.

white hat down to his ears, and without saying another word climbed into the old car and was soon lost to view behind a cloud of dust, while Hank chuckled to himself as he opened the door to the show-

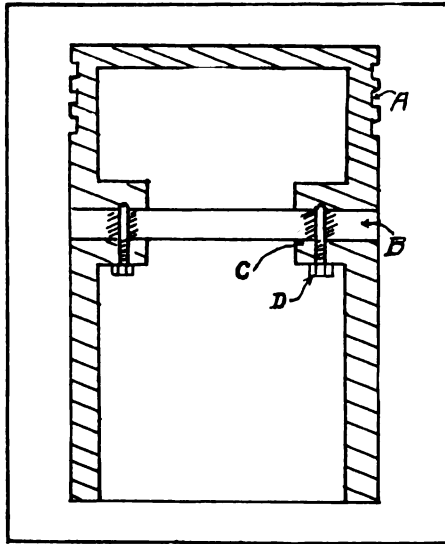


Fig. 4—Cross Section of Piston with Wrist-Pin Held In Place by Two Screws.

room and placed the new car on the floor.

Bill was somewhat of a mechanic himself, having spent some little time in the machine shops before venturing into the farming business, and all the way home he was thinking. The more he thought about the overhauling and repainting of the old car, the more he thought if it was a money-making proposition for Hank, it would be equally good for him, and that he could do the work himself or, at least, most of it.

After sleeping on the matter he was determined at least to give the old car the once-over and trust to results. Bill went to work, and after a couple of weeks the old car came out looking as fine as a car could look, and run! It ran, as Bill put it, like a "scared rabbit."

Two days after he took it out of the shop he traded it to a neighbor down the road a short way, taking in the deal some livestock, which he sold for cash a week later, realizing on the entire transaction \$730.65. Bill figured that the expense of the overhaul, including all the new parts necessary, painting, etc., cost him \$123.70. This amount added to the \$245 offered by Hank for the car made \$368.70. Selling the car for \$730.65, Bill figured he had just made for his trouble \$371.95.

Since the time of the first overhaul Bill has never driven a new car, but deals in second hand ones exclusively—in fact, he uses most of the old cars that Hank takes in trades. There are a lot of dealers and users who could do the same thing that Bill is doing and make some good money for themselves and at the same time give their customers good honest value for their money.

"In overhauling the engine it will be

necessary to have a small hoist of some sort to take it from the chassis and a suitable bench or stand to lay it on while working on the bearings. Before attempting to remove the engine, displace the radiator and place it where it will not become damaged from something being thrown onto it.

"After the engine is taken from the frame, it should be thoroughly cleaned to remove all dirt and grease, and a very good plan to pursue is to use gasoline or kerosene, applying it with a stiff brush, or some sort of a sprayer having quite a little pressure.

"Have suitable boxes to place the small parts in so they will not become displaced during the overhauling. Cigar boxes answer very well for the smaller ones and shell boxes, which may be obtained at the hardware stores, are fine for the larger parts, such as carburetor, magneto, and small gears.

"When I speak of overhauling, I mean a thorough job—that is, taking up all the bearings, crankshaft, connecting-rod, camshaft, etc., grinding-in and adjusting the valves, looking after the valve springs, replacing the worn or broken bushings, supplying new gears where necessary, new for worn or broken roller or annular bearings, and supplying all the necessary gaskets to make the cases oil tight."

The parts that are apt to need the most attention are the crankshaft, connecting-rod and camshaft bearings. The valves and rings are very likely to need attention as well. In Fig. 1 is shown a connecting-rod of the most common type, A representing the complete rod. At B is shown the Babbitt bushing which comes in contact

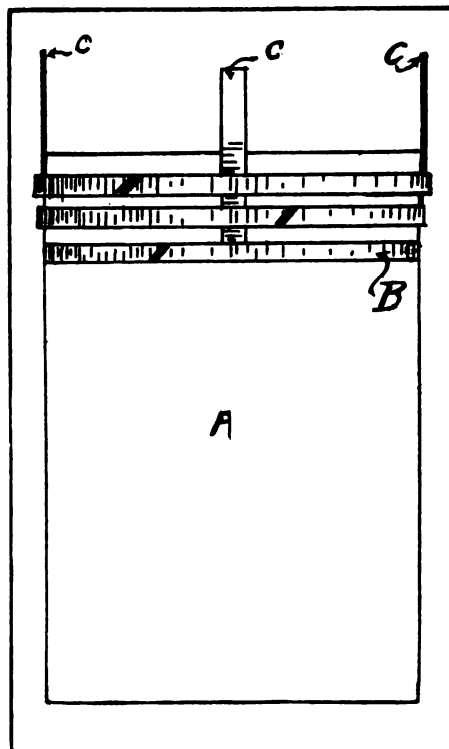


Fig. 5—To Remove and Replace Rings a Few Strips of Tin Can Be Used.

with the polished surface of the crankshaft, G.

An engine that has been used for any great length of time may have what is termed a "flat" crankshaft, as shown at M.

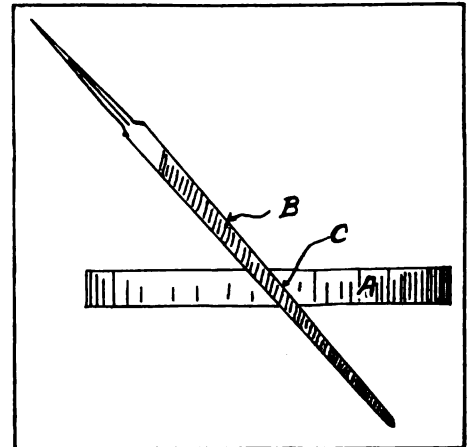


Fig. 6—A Ring That is a Trifle Large When It is Placed in the Cylinder.

There are a number of ways of handling the flat crankshaft, as well as determining the extent of flatness. However, we will take that up at another time. Here we might mention that a very flat crankshaft should be replaced with a new one, for it is impossible to keep the bearings properly adjusted to a "flat" shaft.

Detailed instructions are not necessary for removing the engine from the chassis as all bolts holding it in place are readily seen after the grease and dirt have been removed. Therefore, we will start operation with the engine out and the pan removed exposing the bearings.

We will take up the fitting of the connecting-rods. First, remove the cotter pin, F, and nut, E, on each of the bolts holding the cap on the rod proper, allowing the bearing to come apart. There will be found a number of shims, D, which can be removed, an equal number from each side, until a snug fit is had on the polished shaft, G. Next tighten the nuts, E, and turn the rod around.

It should be so adjusted to the shaft that the weight of the piston at H will slowly drag it down. In case it is tight at one point and loose at the other, it is an indication of a "flat" shaft and the shaft should either be reground or a new one purchased. Many times the bearing is out of true, or it may have what we term "high spots," in which case it will be necessary to remove them by scraping.

A very good plan to follow will be to take Prussian blue and spread it evenly over the shaft, placing the rod in position and tightening the nuts sufficiently to cause it to pinch the shaft. Turn the rod around a couple of times and remove the nuts holding the cap and note the spots on the bearing that are blue. These are the high spots that will require scraping down.

As soon as all high spots have been scraped down, give the shaft another coat

and repeat the operation until the blue shows even distribution over the entire bearing when the cap is tightened. The bearing will need no further attention and the next bearing should be treated in a

moulded in shape in the rod, cannot be removed except to be broken out. In case a bearing of this type is broken or worn, it is a good plan to return the old rod to the nearest service station and have a new one

should be taken that the oil channels, *D*, are open and that the oil hole, *C*, in the lower half of the bearing corresponds with that of the connecting-rod. These bearings are made of Babbitt metal; some manufacturers prefer a shell of brass with an inner lining of Babbitt metal.

After the connecting-rod bearings are adjusted, look over the pistons. In Fig. 4 is shown a cross-section of a piston with a wrist pin, *B*, held in place by two screws, *D*, passing through the pin at *C*. This style of wrist-pin locking device is used in connection with the connecting-rod shown in Fig. 1, having a solid brass bearing as already described. Examine the center, or the bearing part, of the wrist pin, *B*, to see that it is not worn. If worn, replace with new as they are not expensive. When they are a little loose, the engine will not run quietly.

Next, examine the rings for wear. See if there are any black spots on the outer surface where they should bear against the cylinder. If there are, the rings are allowing the burned gas to pass to the crankcase below and they should be replaced with new rings. Remove the rings from the piston and place the rings in the cylinder and note how close the rings come together. If there is quite a little space between the ends of the cylinder rings when they are in place in the cylinder, it will be an opening for the gas to escape to the crankcase below, quite materially affecting the running of the engine.

The rings should fit the grooves, *A*, perfectly—that is, they should not bind at any point so that when the loose ends are compressed, they will stick and not come out. In case they do this, a very fine sheet of emery cloth can be stretched over a flat surface and the ring worked over it until the desired fit is obtained. Some pre-

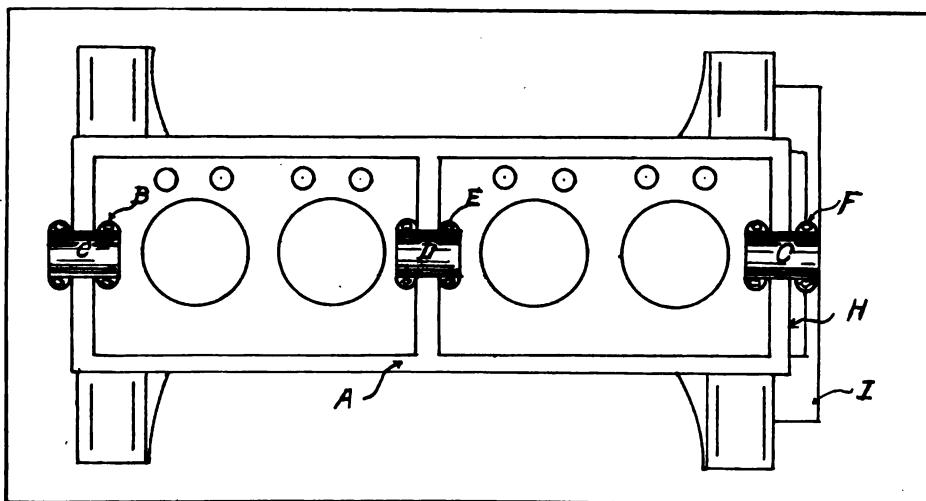


Fig. 7—Lower Half of Crankcase Which Carries the Crankshaft.

like manner. This will be the bearing at the upper end of the rod through which passes the wrist pin, holding the piston to the rod.

Note if the wrist pin fits snug in the bearing. If not, the bearing should be taken out and a new one supplied. There are times when the pin should be replaced, but in nearly every instance the trouble will be found in the bushings. The bearing is represented in Fig. 1 at *K* and the pin at *I*. There are some types of bushings used in the upper end of the connecting-rod that are adjustable, in which case the adjustment may be made and it will not be necessary to replace with new.

Care should be taken in replacing the bearing that the oil hole in the top of the rod proper is in line with the oil hole in the bearing. If it is not, the bearing will not get the proper amount of oil and it will be but a very short time, especially if the bearing fits the pin snugly, until the bearing will seize, causing a piston slap that will be very annoying, particularly if the piston has any looseness to speak of.

A badly-worn bushing at this point can, and many times does, result in a broken piston, because of the quick jerk that it is subjected to when the crankshaft is turning very rapidly.

Give the upper end of the connecting-rod attention next and note how the bearing, *K*, fits the bearing, *I*. If loose, it will be necessary to remove the bearing, *K*, and replace with a new one, if it is not adjustable. In replacing the old with the new, the little oil hole in the bushing should line exactly with the one in the upper end of the rod.

Referring once more to the bearing shown at *B*, there are two general types in use—the die-cast and the run-in bearing. The die-cast bearing is shown in Fig. 2 and can be replaced at will. The run-in bearing,

installed, as the service station has the proper equipment for doing the work.

A type of connecting-rod generally used is shown in Fig. 3. It differs from the one already described in that the upper end, at *B*, has no bearing at all, the bearing being in the piston. This end has a screw, *E*, which, when tightened, pinches the wrist pin, *B*, to prevent it coming out of place and scoring the walls of the cylinder.

There is a space, *C*, at *X* which does not come together, if the gap is closed before the wrist pin is gripped sufficiently to keep it from moving. In case the points, *X*, come together before the pin grips, a hack-saw blade should be run through removing a sufficient amount of the metal to make a correct fit. When replacing the screw, *D*, a long stiff cotter key should be

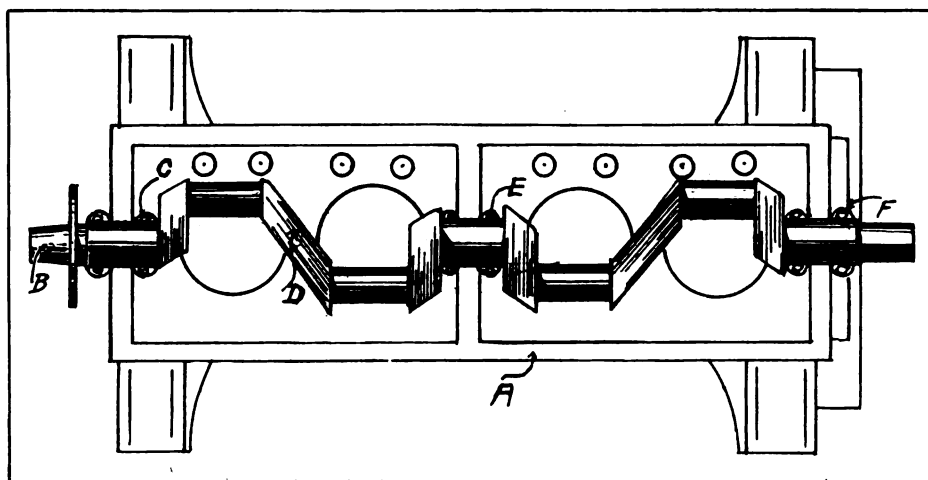


Fig. 8—The Crankshaft in Place but Not Adjusted.

inserted at *E* to prevent the screw from working loose.

In Fig. 2 is shown a die-cast connecting-rod bearing. Fitting these bearings is not a difficult task. Of course, they may need fitting as previously explained. Care

for a patented or special type of ring to the ordinary kind. This, however, is a matter of choice, for most any ring will give satisfactory results when properly installed.

To remove and replace the rings on the

piston, a few strips of tin can be used as shown at *C*, Fig. 5. The rings may be expanded and the strips slipped under it as shown at three or four points.

The rings can be slipped off and on with

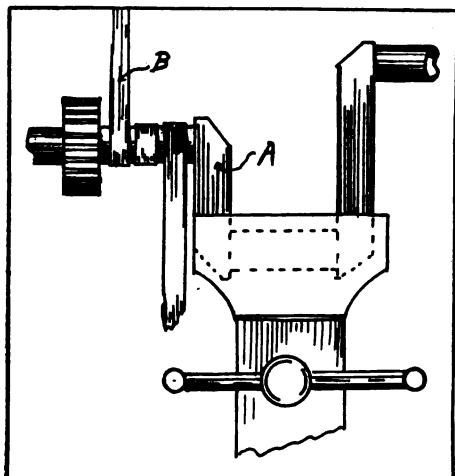


Fig. 9—Use Piece of Fine Emery Cloth to Remove Rough Spots on Shaft.

ease. There is less danger of breaking the rings if handled in this manner than the old way of running something under one end of the ring and prying it off the groove. The ring at *B* should fit just firm enough so that it will turn about easily after strips, *C*, have been removed from piston *A*.

All carbon deposits should be removed from the rings before they are replaced. In case the rings are a little large in diameter, they can be altered with the file until they fit correctly. In Fig. 6 is shown a ring that is a trifle large—that is, when it is placed in the cylinder. The ends instead of just coming together, overlap, so to speak.

To remedy this, take a fine flat file and place it between the ends of the rings, holding them on a level surface, applying a little pressure to each end of the ring and draw the file back and forth until ring *A*, when placed in the cylinder, *C*, will have just clearance enough between the points so that a very thin piece of paper will pass through. In case the ends are too close, or the ring is too large when it is heated, the ring will expand causing the cylinder to be scored. Frequently this will cause the piston to seize, thus stopping the engine entirely.

Not long ago the writer had a job where the owner had placed a new set of rings. Instead of fitting them, he placed them just as they came from the factory and when they went in tight, he used a block and a hammer to drive the piston into the cylinder. The result was the engine could not be started and the entire engine had to be disassembled and the job done over. One cannot be too careful in fitting rings. The rings and the walls of the cylinder should always be well oiled when re-assembling the engine.

In Fig. 7 is shown the lower half of the crankcase which carries the crankshaft. The crankshaft is the shaft running through

the case to which the connecting-rods are fastened as already described. The shaft usually has, in the case of a four-cylinder engine, three bearings known as main bearings. These bearings need adjustment and attention, but not so often as the connecting-rod bearings.

The main bearings should be adjusted one at a time. These bearings are shown at *B*, *E*, and *F*. Remove all the caps from the bearings and note their condition. If they are smooth and bright, adjust them by removing shims from either side.

Examine the studs holding the caps and note whether they are loose in the frame, or case, as we more commonly call it. Examine the crankshaft bearings for wear. Remove the old gasket and shellac from the case. The case is now ready for the crankshaft.

At *D*, Fig. 8 is shown a crankshaft in place but not adjusted. With all bearings loose begin with the back one. Take the cap from the bearing and remove a shim from each side, when the cap should be replaced and the nuts tightened as shown at *C* until perfectly tight. Now try the shaft to see whether it is tight or loose. If it will just turn with a little noticeable friction, it is about right.

Cover the shaft now with a thin coat of Prussian blue and again tighten the cap and revolve the shaft. Remove the cap and note if the blue is evenly distributed over the bearing. In case it is, the bearing is ready to leave for the time being as soon as the nuts are slightly loosened. Take the next bearing in order and proceed in exactly the same manner, and so on until all the bearings have been gone over as the first.

When this has been done, tighten all the caps down tight and note how the shaft turns. It should not turn quite stiff, so to speak, yet it should be turned with the hands, grasping the shaft at both sides of the center bearing. When this is done, the connecting-rods can be placed on the shaft.

In case there is a rough spot on the shaft, it can be removed by using a piece of fine emery cloth, *B*, Fig. 9. Pull the cloth back and forth until the bearing is smooth. In case it does not have the polish desired, repeat the operation with a piece or strip of canvas saturated with pumice stone and water.

To much care cannot be exercised in fitting the bearings. Care should be taken that oil channels do not become clogged during the operation, or the bearings may be melted out after the engine is started before lubrication in the regular way can reach them.

A valve in position for grinding is shown at *A*, Fig. 10. A leaky valve causes a direct loss of power and many times a missing cylinder—in fact, it quite materially affects the operation of the engine. To grind the valve proceed as follows:

Place valve *A* into the valve seat with a small light spring under it as shown at *B*.

The spring should be just stiff enough to nicely lift the valve from the seat as the pressure from the grinding tool is released. Place a small quantity of the grinding material on the valve head as shown at *I* and insert the grinding tool bit at *H*.

Grind the valve for a few seconds and remove the tension from the tool and the spring will force the valve up out of the seat permitting of it coming down again in a different position. Grind the valve until all pits or spots are removed from the valve head at *I* and a bright, smooth surface shows all the way around the seat, both on the valve head and in the valve seat. Now wash the valve in kerosene as well as the seat in the cast head.

When the seat looks perfect, remove the spring, *B*, and drop the valve back and adjust the space between the push rod, *F*, and the valve stem, *E*, until a thin piece of paper will just pass between them. There may be occasions when this adjustment may be a trifle close owing to the expansion of the metals when the motor is heated. Hence, judgment will be required in making the adjustment on the different motors.

When the adjustment is made, place the valve spring, in the correct position over valve stem *C*, locking it with the locking device used for the purpose, and pass to the next one, repeating the operation until all are ground.

Examine the valve stem guide for wear,

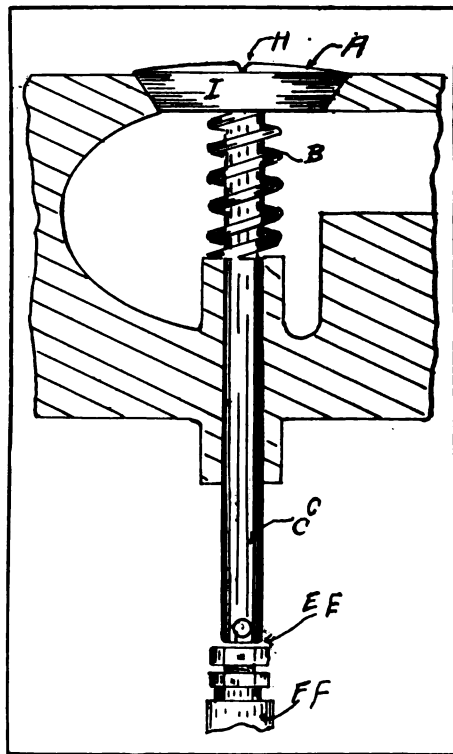


Fig. 10—A Valve in Position for Grinding Is Shown at *A*.

for when worn sufficiently to allow the valve stem to play, an extra quantity of air is taken in through this point and the carburetor cannot be correctly adjusted for more than one speed. This, however, applies more particularly to the intake valve.



A leak at this point in case of the exhaust valve would not affect the gas mixture taken to the combustion space. In case the valve stem is worn sufficiently to admit air, it is much better to replace the valve and

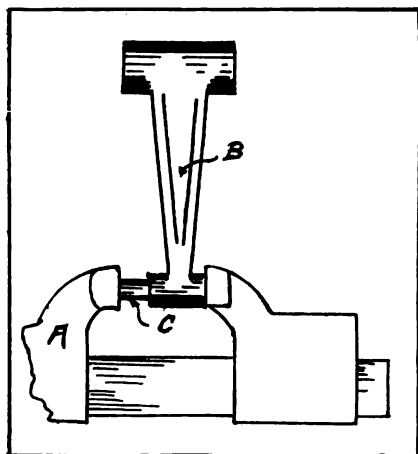


Fig. 11—Simple Method of Forcing Small Solid Brass Bushings with Bench Vise.

the valve guide with new than it is to try repairing the old one.

At Fig. 11 is shown a simple method of forcing small solid brass bushings in place with the ordinary bench vise, when one does not have access to a press of some sort suitable for the work is illustrated in Fig. 11.

Open vise *A* up until the bushing can be started at *C* into lower end of *B*. By gently screwing up the vise, the bushing can be forced into place very nicely without injury. This little kink will be found quite useful when forcing small bushings into their carriers.

Removing the gears from the camshaft, or the crankshaft is frequently no easy task, especially without some tools for the purpose. Many gear wheels have a couple of threaded holes located in such manner that a couple of cap screws, *C C*, can be placed and the gear forced off, as shown in Fig. 12. The gear wheel is shown at *A* and the shaft from which it is to be removed is shown at *B*. By placing the wrench on *C* and screwing first one and then the other, the wheel is gently forced from the shaft and no injury is done either the shaft or the wheel.

#### Repainting the Body.

When painting the car many things must be considered if a first class job is to be expected. Metal contracts and expands with heat and cold and a paint must be used that is adaptable to the work. The metal must be cleaned of all the rust and thoroughly sandpapered before the priming coat is applied. The brushes used for the work must not be too stiff or of such poor quality that they will lose their bristles, leaving them sticking about the body imbedded in the paint.

Sufficient time should be given for drying each coat before applying the next, and the body should be placed where dust cannot collect while the paint is green.

"Mossing" of the color coat and rubbing down of the color varnish coat will smooth the surface of the finish, improve the appearance, and add materially to the durability.

The following list of materials will be found to be about what is wanted for the repainting of the old car. One-half gallon paint and varnish remover, 1 pint metal primer,  $\frac{1}{2}$  pound of putty, 1 pint to  $1\frac{1}{2}$  pint color; 1 pint color varnish, 1 pint rubbing varnish, 1 pint finishing varnish and some sandpaper.

The body should be washed thoroughly with cold water to remove all dirt and grease and thoroughly dried, after which the paint and varnish remover is applied. After the paint has become softened, which will be in a few minutes after the remover is put on, scrape it off with a putty knife. When the old paint is removed, wash the metal with gasoline and sandpaper it thoroughly with No.  $\frac{1}{2}$  sandpaper until it is bright and smooth. Dust off the surface with a dry brush and let it stand for a few hours.

Apply one coat of metal primer with a  $1\frac{1}{2}$ -inch camel-hair brush allowing 24 to 30 hours for the priming coat to dry. Next take the putty knife and fill all crevices, allowing it to dry from 5 to 6 hours, after which the job should be gone over carefully with No. 00 sandpaper until it is entirely smooth.

Then brush off with a duster. Next apply one coat of the color with the  $1\frac{1}{2}$ -inch camel-hair brush and allow 24 to 30 hours for drying.

The body should then be rubbed—a patch about a foot square at a time with curled hair, such as is found in the upholstery of the car. This operation will leave the surface somewhat scratched but this only tends to knit the finishing coats. Dust the job again and apply a coat of color varnish with a  $1\frac{1}{2}$  inch badger filled brush, allowing 24 hours for drying, being careful to moss the coat well.

Now apply a coat of rubbing varnish with the badger filled brush and allow it to dry about the same length of time. Wet the entire body and rub down with pumice stone and water and a piece of felt. Wipe off

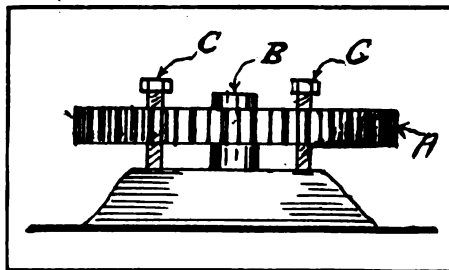


Fig. 12—Cap Screws Can Be Put In Threaded Holes In Gear Wheel and Gear Forced Off.

with a dry cloth and allow to dry for a few hours.

Now go over the body carefully with cheesecloth saturated with a mixture consisting of about a quart of water, a small

quantity of gasoline and a couple of teaspoons of olive oil. Then with a piece of cheesecloth made sticky with a little rubbing varnish, rub over the surface of the body for the purpose of removing lint and dirt. Now apply one coat of finishing varnish with a badger filled brush, taking care that the varnish does not run, and leave for 24 to 30 hours to dry.

The job is now finished and will look and wear as well as the work turned out at the factory, or at least it does when Bill does it.

#### A Ford Owner's Money, Time, and Patience Saver.

The accompanying snapshot shows how one ingenious Ford owner avoids doing any strenuous work changing tires on the road.

While at his home garage, comfortably clad in overalls or coveralls, he sets a tire on the rim of the extra wheel. Then if



If Misfortune Comes the Way of the Motorist the Extra Wheel Is a Time Saver.

misfortune sends puncture or blowout his way next trip, he merely has to remove six burrs, slip off the disabled tire, wheel and all, and substitute the emergency wheel—a vastly simpler, easier, cleaner operation than falls to the lot of the rank and file of Ford owners.

To make this possible, it was necessary to drill out the rivets that fastened the wheels to the axles, substituting bolts therefor, in order to be able to remove the wheels easily. The additional expense of the fifth wheel and bolt substitution is about \$30.

The saving in dry-cleaner's bills in one season will more than offset that amount. And think of the comfort of knowing one can keep "rambling right along" with comparatively little trouble.

The removable wheel not a new idea? Maybe not, on the more expensive cars, but for a Ford owner, yes, indeed!

#### The Up-to-Date Barbers Use Taxicabs for Customers.

Out in Parsons, Kans., barbers, who have patrons elsewhere than at their shops, ride to and from the job in a taxicab at the expense of the patron—the taxi fare being in addition to the regular price of \$1 a shave.

The provision was recently inaugurated under the new price schedule adopted by the local barbers.

# Welding, Cutting and Brazing Practice

If the Welder Masters the Art of Welding Automobile Crankshafts, He Will Be Proficient to Handle the Larger Types of Crankshaft Welding—Essential Features of Such Welding and a Review of Characteristics of Steel

By David Baxter

The oxy-acetylene torch welder will find the repairing of broken automobile engine crankshafts to be a profitable line of business if he will devote some time to the study and practice of this particular branch of the welder's craft. And when he masters the art of welding automobile crankshafts, he should be proficient enough to handle the larger types of crankshafts, such as heavy-duty farm tractors, gasoline engines, and even large steam engines. The principle involved is practically the same for all classes, although the heavier shafts will probably require more skill on account of the longer duration of sustained effort.

The crankshafts of all automobile engines are practically the same in the modern motor cars. So that once the welder learns how to do the work on one style, he should be able to repair any of them with little trouble. The fundamentals of the welding process are the same for all, while the minor factors of the process applied to the various kinds of cars are easily adjusted to shop conditions and the abilities of the individual operators.

Of course, there may be a difference in the kind of steel in the various crankshafts, but this is of little moment except possibly in cars manufactured several years ago. In either event, the choice of filler rods is the most essential factor; otherwise the welding process is the same, unless a slight variation in flame manipulation is counted.

A strictly neutral flame is employed in all cases but is handled differently in some. For instance, some welders find it better to weld with the white cone farther from the welding metal; others seem to be more successful by directing the flame diagonally across the weld instead of employing a vertical position with the dipping motion. These things are much a matter of personal preference, but the careful welder will often shift from one method to another in a single weld. However, he will never bore the white cone directly into the melting weld, unless it is just for an instant to flirt out a bit of slag.

In a discussion of the art of welding broken crankshafts it is practically impossible to cover all of the divisions of this class of work since it would lead to a long consideration of the effects of different components of steel, for crankshaft welding comes under the head of general steel welding. Therefore, for present purposes, it is no doubt better to class all crankshafts in one group and leave it to the judgment of the individual torch operator to make

such changes in the instructions as his experience and ability warrants. It will therefore be understood that the instruction given is not arbitrary only in so far as the fundamental factors are concerned.

Before taking up the actual welding of crank shafts, let us review some of the characteristics of steel as it reacts under the flame, together with some of the essential features of the torch process:

First, there is always great danger of burning, or of oxidizing, the steel in the crankshaft, and in the filler rod, due to the oxygen of the flame uniting with the metal in the form of oxide, or to form oxide, and it should be remembered that the oxygen of the air also attacks all melted surfaces, rapidly turning them to oxide.

The oxidization by the flame is usually caused by the flame not being regulated properly; or in other words, that it carries an excess of oxygen—or expressed differently, too little acetylene. Therefore, the flame should be strictly neutral—equal parts of oxygen and acetylene. But the flame may be strictly neutral and yet oxidize the weld, if it is held motionless in direct contact with the melting steel longer than a

because it keeps too large a zone of the weld in fusion, thus laying it open to oxidization by the oxygen of the atmosphere, or by burning the filler rod before the weld is ready for it.

By this we see that the flame size should be just about right for the job and that it is well to follow closely the tables of sizes usually furnished by the torch manufacturer.

Another characteristic of steel is what is termed "carbonizing." In welding, this is caused principally by an excess of acetylene in the welding flame. Here again the flame is not neutral; it carries more acetylene than oxygen, or less oxygen than acetylene. The acetylene is rich in carbon which is forced by the power of the flame into the molten weld, to make it brittle. And even though it is not forced into the weld, it is readily absorbed by the latter with the same result—carbonizing.

As the carbon content of the steel is increased, the brittleness increases. Steel high in carbon is hard and brittle and very difficult to weld, while steel low in carbon is ductile and easily welded. Less than 1 per cent of carbon represents the difference between high and low carbon, so the welder can readily perceive the danger of carbonizing a weld. The chief preventative is a strictly neutral flame, properly handled.

Now as to the most essential features of the welding of automobile crankshafts, aside from the choice of proper size flame and correct regulation of it. The flame should be almost continually in motion, either revolving in tiny circles over the weld or swinging in short arcs over it. This motion is intended to keep the melted weld fluid, while the filler is being added, in order that the filler may be fused without burning. If the weld is kept fluid while the filler is melted into it and neither one is burned, we are pretty apt to get a strong bond.

Burning or oxidizing of steel is detected by the increasing number of sparks that fly from the weld, the oxidizing sparks being those that are alive, or which fly farther and burst something like a miniature star-shell. They increase in number as the oxidization increases until a perfect shower is being thrown off. As soon as this increase begins, the operator should attend to his flame either by regulating it or by changing the manner of manipulating it.

Yet another factor of crankshaft welding, or steel welding, is the filler rod and its handling. The careful welder will purchase special rods for special jobs, of which



Fig. 1—Shaft in Position for Spot Welding—Extent of Chamfering the Fracture.

few seconds. We see by this that a correct flame must be correctly manipulated.

The size of the flame in relation to the size of the weld will often cause a higher rate of oxidization, even though it is a neutral one. A flame too large for the weld tends to oxidize both the weld and the filler

crankshaft welding is one. While Swedish or Norway iron is capable of producing a fairly good weld, it is better to purchase filler rods made especially for the purpose. In fact, the welder who caters to all classes of work should have always on hand a number of different kinds of filler for special jobs. Crankshaft welding is one form of a special job for which the welder should have special filler metal. Hence, a goodly supply of several different sizes is to be recommended.

Even though the welder has the proper kind and size of filler rod, he is liable to make a poor weld if it is not properly handled in applying it to the weld. Some of the essential features of filler application are that it should always be in contact with the weld when it is melted; that it should be twisted or rotated in the weld; that it should be flowed into the weld diagonally.

The filler should not be caused or allowed to drop onto the weld since this tends to oxidize the bit of melted filler as it passes through the air, even though the passage is but a mere fraction of an inch. The passage through the air also tends to cool the drop enough so that it will not properly unite with the weld, thus causing an unconnected section, which may or may not be apparent to the welder.

He should, therefore, be certain the weld is ready to receive the filler when it is added. The melted part to which the filler is added should be more than surface deep. In a word, the heat of the flame should be made to soak into the metal until it is melted considerably below the surface, say, at least an eighth of an inch below the surface. This furnishes a solid footing for the filler—in other words, an opportunity for the two metals to mix and join in one mass. It is an opportunity for the upper metal to break through the skin and soak into the lower metal and to assist the mixing, the filler is literally pushed into the molten weld, instead of piling on top, as it were.

The twisting and prodding of the filler also tends to break and loosen any hidden or surface bits of slag or oxide, when they may be easily floated and blown or scraped away. It forms, in effect, a cleansing of the weld. However, care must be taken to see that no time is lost in the filling process on account of the danger of ruining both the filler and the weld through burning. The operator should work rapidly and deftly, endeavoring to create harmony between the filler, flame, and melting weld. All three should work in unison as though of one mind.

As these generalities are carefully noted, let us proceed to specific examples of crankshaft welding with the understanding that we adhere to the rules given only so far as they serve our ends, so that each welder may suit means to conditions in his own shop.

There are several forms of fractures in

the common automobile crankshaft. Of these, we are concerned chiefly with the location of the break. So let us take them one at a time and endeavor to make clear what is to be done in each case to make the necessary repair.

First, take a break located in a straight part of the shaft such as is indicated in

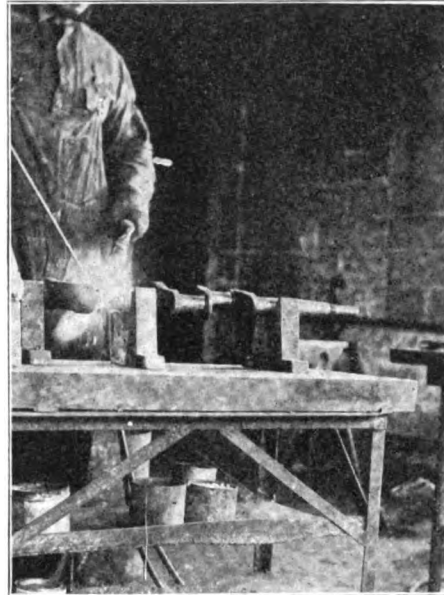


Fig. 2—V-Block Arrangement for Revolving the Crankshaft.

Fig. 1. Such a fracture may seldom occur, but it is well to know how to treat it because the treatment may be employed for other kinds of shafting. When it does occur in a crankshaft, it is usually in a journal.

Each of the broken ends are made wedge-shape as indicated in the drawing. This is accomplished in several ways—by grinding on an emery wheel; by filing or cutting with a chisel; or by utilizing the cutting attachment of the torch to remove the desired amount of metal. The latter method is probably the fastest, but it doesn't always give the best results due to the more or less oxidized condition of the wedge after cutting.

Both ends of the fracture are wedged the same so that when they are fitted together they will form a wide V-groove on two sides of the shaft. Each groove is approximately twice as wide at the top as half the diameter of the journal—a rule which may be varied slightly either way without materially affecting the results of the welding. In shaping the wedges, at least a tiny strip of the original shafting should be preserved to assist in aligning the cranks. This aligning is quite an important part of the process of welding broken crankshafts.

No matter how carefully the work is done, there is usually a certain amount of truing-up to be done after the job is welded.

In nearly all cases, the shaft will have to be trued in a lathe. Especially is this a case where the weld is made in one of the

cranks, because it will be necessary to machine and polish the bearing surface. However, the welder should take steps to minimize the amount of machining by welding the shaft as near in line as possible with a straight edge, leveling plate, and calipers.

The work may also be done with a make-shift bearing case consisting of adjustable uprights which engage the different cranks, Fig. 1, or a set of V-blocks, Fig. 2, may be used to obtain and assist in keeping a fair alignment. Before placing the shaft in the V-blocks, the broken parts may be fastened together by tacking or spot-welding. To do this, the crankshaft is placed upon an iron leveling plate in such a way as will permit it to rest in alignment while two or three parts of the bottom of one groove are melted with the welding flame, a small amount of filler metal being added when necessary.

When these spot welds have cooled sufficiently, the shaft is placed in the V-blocks with one of the grooves upward. The arrangement should be such that the crank can be easily revolved but will not turn of its own weight. A V-block is placed on either side of the shaft to hold the crank as the grooves are revolved from side to side.

When the device is arranged, Fig. 2, the welding is accomplished as follows: First, the entire length of the upper groove bottom is melted together without filler metal by playing the flame back and forth along the groove with the tip of the white cone of flame barely licking the metal. Then the filler rod, not less than 3-16ths of an inch in diameter, is brought in contact with one end of the groove. The welding flame is then manipulated to melt the filler and groove together.

The groove should be prepared slightly in advance of the filler and as soon as the groove is melted sufficiently, the filler should be melted and ready to be fed into it. A portion of the rod is added to the weld, filling it, say, half an inch deep. Then another portion is added to the first, followed by another and another until the groove contains a solid layer of filler metal, care being taken to see that it mixes with and adheres to the sides as well as to the bottom of the groove.

When the first layer is finished, a second layer is fused to the top of it, making the groove about half full. At this point, some welders prefer to turn the shaft over and fill half of the lower groove in the same manner. Others prefer to go ahead and fill the entire upper groove before attacking the lower one, but this sometimes causes a warped shaft, due to contraction of the first welding. In the event it is added a layer at a time as just described, except that each layer will be wider and shallower as the groove is filled, greater care must be exercised to see that the side walls as well as the surface of the layer are fused.

Where the revolving method is used, the second groove is filled about half, then as

(Concluded on page 34.)





# Practical Hints for Shop Mechanics

## Garage Door Guard.

To prevent the garage door from being knocked off when cars are backing out, guard rails can be placed on the inside of the exit. If the floor is of wood, the guard should be made of the same material; if concrete, concrete rails should be built, and in either case the rails should be about four inches high, semi-circular, and converge six feet from the doorway. This will force the wheels, when backing out, to the center of the drive, and make the car pass out through the center of the doorway.

\* \* \*

## To Figure Weight of Car.

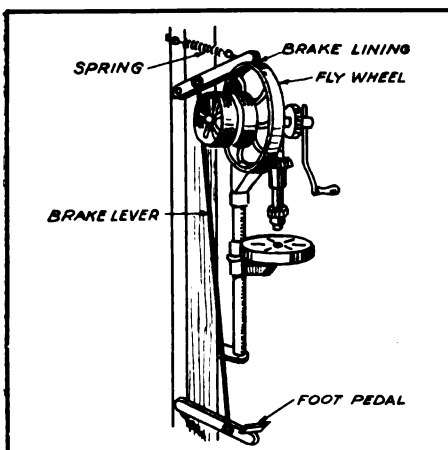
It is said that if the air pressure in the tire casings of a car is known, the car's weight can be determined. The operation is a comparatively simple one. All that is necessary is to obtain a tracing, or an impression on a piece of paper, of that portion of the tread which rests on the ground.

Each of the four tires will be found to make an elliptical impression when standing, and it is only necessary to square the dimensions of the ellipse, multiply it by 0.7854 and again by the pounds of pressure in the tire, to obtain the weight of that one-quarter of the car. To arrive at the weight of the entire car, it is necessary to repeat the formula with each tire.—B. S., Pa.

\* \* \*

## Brake for Drill Press.

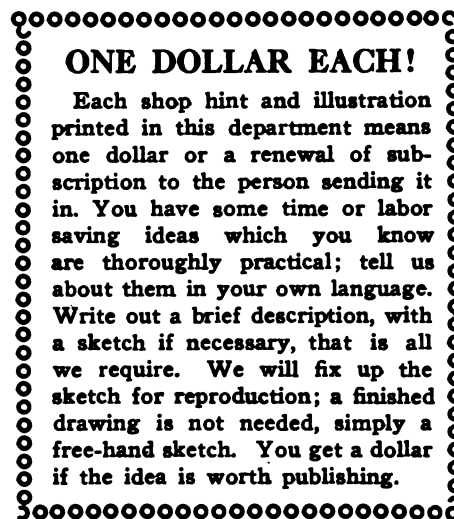
The chuck in a power-driven drill press continues to spin for some time after the power has been turned off. Quite a bit of



The Drill Press Brake Saves Much Time.

time is lost in waiting for it to run down before the drill can be removed.

Make a brake to operate on the balance wheel and operate with a foot lever. Line the hardwood brake block with a piece of brake lining, and attach a spring to with-



## ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

draw the brake block when pressure is removed from the foot pedal.—P. M., Pa.

\* \* \*

## Split Washers.

When castellated nuts and cotter pins are not supplied in automobile construction, well-tempered split washers may be placed under the heads of the bolts to keep them from rattling loose.—D. P., Mich.

\* \* \*

## Truing Wire Wheels.

In truing a slightly misaligned wire wheel, a close-fitting wrench or parallel pliers should be used on the nipples, and the operation should be performed slowly and evenly. A wooden block serves to steady the hand in chalking the "out" and "in" places on the wheel.

The general principle is that tightening nipples on the outer rows of spokes throws the rim in, while tightening those of the inner row moves the rim out. Nipples directly opposite those tightened should be loosened about half as much.—L. T., Cal.

\* \* \*

## Substitute for Felt Washer.

An ordinary corn or bunion plaster makes a very acceptable felt washer when no other is at hand.—P. D., Ill.

\* \* \*

## Protecting the Mudguards.

In making extensive engine repairs or adjustments, it often happens that the mudguard or fender will be bent and otherwise marred. This may be prevented by making a cover of some heavy material, oilcloth, or imitation leather of some kind, which will cover the fender from its tip to the place where it is fastened to the running board.—G. L. Mo.

## Round Pin Holder.

A holder made as follows, makes the inserting of round pins in valve stems and other parts a simple matter:

Wrap a piece of .064 gage wire around the pin three times in loose coils. Then make a half coil at the bottom to prevent the pin from slipping all the way through. The use of this holder prevents pinching of fingers in case the spring slips when it is being held by the valve lifter.—F. R., Ill.

\* \* \*

## Gasket Material.

Different locations demand different types of gasket material depending on whether they are to be subject to the action of water, oil or gas. Gaskets in the water line should generally be of graphited asbestos, cut from a sheet and then spread with shellac.

Care must be taken not to get too much shellac, because where there is an excess, some of the shellac may be squeezed into the water jacket and make trouble. For oil joints, use paper and for gas joints, copper-covered asbestos.—M. S., Ohio.

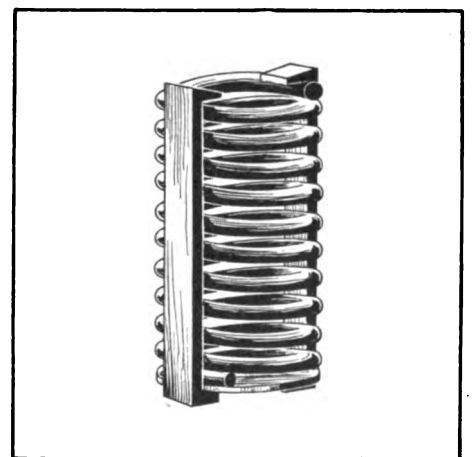
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## Valve Spring Clamp.

There are many devices recommended which will help put valve springs back into place. In most cases it is necessary to make a special device for each make of car.

A simply constructed clamp, as illustrated, can be made of flat pieces of iron, the ends of which are bent at right angles as shown.

After removing the valve spring, it



The Special Valve Spring Clamp.

should be compressed in a vise and secured by two clips. The vise is then removed and the spring will be held in compression by the clamps, after which the replacement of valve spring is easily accomplished.—S. G., Ill.

### Spark-Plug Cleaner.

Spark-plug porcelains may be freed of all carbonaceous or other foreign matter by soaking them in a solution of carbon disulphide, obtainable at any drug store. This solution dissolves the carbon and leaves the porcelain bright.

Of course, this treatment applies particularly to the type of porcelain which is removable from the shell of the plug, but the same method of cleaning can be used even if the plug is of the so-called one-piece type.

Just soak the whole plug, shell and all. It doesn't do any harm, and is one reasonably effective way of attacking that carbon which resists the efforts to dig it out with a knife or other tool.—L. N., Cal.

\* \* \*

### For Brake Squeaks.

Chronic squeaking of the braking system is generally due to dirt in the lining pressed against the drum when the brakes are operated. Usually this dirt may be washed out with kerosene, but if it is so firmly intrenched that it refuses to come out with this treatment, a little resin mixed with castor oil and applied to the bands will cure this trouble.—L. T., Cal.

\* \* \*

### Use for a Mirror.

In making adjustments in the differential housing, it is a good plan to use a small mirror, the reflection of the ring gear and pinion in this enables the operator to work with more accuracy than the ordinary method of determining conditions by sound. The mirror should have a handle long enough to prevent its being accidentally shut into the differential.—R. T., Cal.

\* \* \*

### Ford Connecting-Rod Bolt Nuts.

Many mechanics have experienced the difficulty of removing nuts from Ford connecting-rod bolts. After the cotter pin is removed, a socket wrench is used to turn the nut. Frequently, the wrench will fail to grip the nut and the usual procedure then is to cut the nut with a cold chisel.

We find that if a plain hex nut and a castellated one are brazed together, the wrench is then afforded a good grip. The regular nuts are so shallow that the corners soon wear off round. If necessary, bolts a trifle longer can be used.—R. W. T., Mo.

\* \* \*

### Shifter Lever Troubles.

Excessive play in the main shaft of the gear set may cause the gear shifter lever to be forced out of position. Usually the thrust bearing on the main shaft is shimmed so that the condition is easily remedied.

End play in this shaft also may be the cause of chattering in the clutch and a bucking when the car is on a grade or otherwise pulling hard under load. If this is not corrected in time, the shaft play may cause permanent injury to the gears.—A. T., Cal.

\* \* \*

### Pipe Joint Cement.

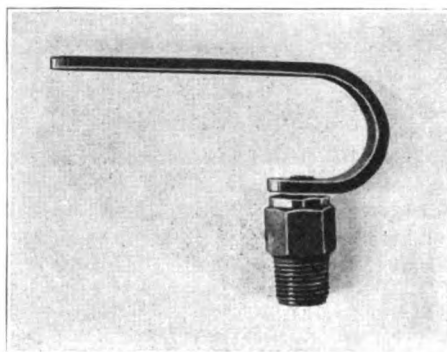
A mixture of 10 parts of iron filings with three parts of chloride of lime mixed to a paste with water, makes an admirable pipe joint cement. The mixture is applied to the joint and the clamp and becomes solid in 12 hours.—P. D., Mich.

\* \* \*

### Lifting Cylinder Heads from Motor.

I have a tool for lifting cylinder heads from the motor. It is made of a piece of flat iron 6 inches by  $\frac{3}{4}$  inches, a hole drilled and tapped to take a  $\frac{5}{16}$ -inch by 1-inch carriage bolt.

Shape the iron as shown in the accompanying illustration. Use a spark-plug butt for the plug, cut a slot in the head of the bolt and insert the bolt in the plug



Tool for Lifting Cylinder Heads.

in place of the porcelain. It is advisable to set the bolt with a prick punch to prevent it from turning out. Put a screwdriver up in the bottom of the plug to hold the bolt in which the slot has been cut. Turn on the handle and the tool is ready for use.—H. U., N. Y.

\* \* \*

### Easily-Made Small Bolt.

About the shop many small bolts are needed for electrical connections and small hose bands such as those found on most foot pumps. Quite often these need replacing and no bolts small enough are at hand.

When a bunch of old broken spark-plugs have accumulated, we take them apart and throw away the old porcelains but save the central electrodes, nuts, and washers. Then when a very small bolt is needed, we run a nut onto the threaded portion of the steel rod and cut off the unthreaded portion with a hacksaw.

This forms the head of the bolt and may be braded if desired. Another nut is found to fit the other end and the bolt is complete.

If the small brass bolts used in some makes of dry cells are saved, they will often be found useful.—T. W., Mo.

### Emergency Jack.

A handy little device that serves as a jack and will lift almost any weight you can put upon it, consists merely of a short length of iron pipe of large enough diameter to receive a bolt, but not the nut that goes on the bolt.

Simply slip the bolt, with a nut screwed part way on, down into the end of the piece of pipe, allowing the shoulder of the nut to rest on the top edge of the pipe and your jack is made. Having set it in position, turn up the nut and this will back out the bolt, thereby exerting a very strong lifting force. By using four of these little pipe jacks, one at each corner of the cylinder block, a very handy lifting method for the heavy iron casting is provided.—C. R., Mass.

\* \* \*

### Remedy for Burns

Very often while working around an engine after it has been in operation for some time, one is liable to be burned by the hot exhaust pipe. An excellent remedy consists of a solution of one part of picric acid to 75 parts of water.

An application of this liquid stops the pain at once and assists in healing the burn. It colors the skin bright yellow, but this color is readily removed by the application of a solution of boracic acid.—C. M., N. M.

\* \* \*

### Car Pushing Bar.

Occasion will sometimes arise when it is better to use a bar for moving disabled cars than a tow rope. Such a bar can be made from a piece of wood 4 ins. by 6 ins. by 10 ft. long.

Metal strips should be attached to each end of the plank and held in place by carriage bolts.—C. S., Ill.

\* \* \*

### Loose Spring Clips.

After a car has been in service for some time, there is a tendency of the spring leaves to fit somewhat tighter together owing to the smooth surfaces that have been produced.

This makes the spring a little more compact by a few thousandths of an inch, but it is enough to loosen the spring clips. These latter parts should, therefore, be drawn tight after a thousand miles or so of travel in the new car.—D. P., Mich.

\* \* \*

### Gasket Punches Made From Pipes.

Many gaskets, having round holes of certain diameters, are needed in the shop. These holes are difficult to cut true.

In spare time, a set of punches may be made from short lengths of pipe. Take the pieces to the emery and grind one end sharp. If care is taken to grind the end very thin, they will cut the exact size of the inside of the pipe. These punches should be used on block of wood driving into the end of the grain.—R. W. T., Mo.

# Readers' Questions and Answers

## Quick Repair for Oil Leak.

I am a subscriber and regular reader of your publication and would be very grateful for some quick method of repairing an oil leak round the shaft near the crankcase.—T. L., Ohio.

Such a leak could be very easily and effectively stopped by cutting a strip of heavy felt and fitting it around the shaft. It can be held in place by a coiled spring such as is used for screen doors. This spring works the felt packing up against the end of the crankcase causing a tight fit and stopping the leak.

\* \* \*

## Water Pump Trouble.

I have been unable to make the water pump on a car in my shop tight. I have replaced it several times, but water still escapes slowly along the shaft. What is the trouble?—K. G., Minn.

The shaft where it passes through the stuffing box is probably worn considerably out of round. If this is the case, it may have to be replaced, for it is almost impossible to pack a shaft in a badly worn condition.

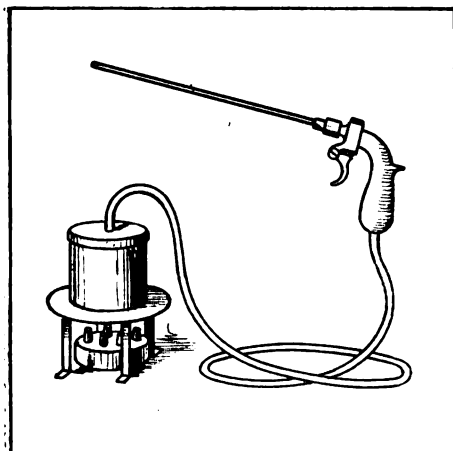
Sometimes it happens that if the radiator is badly clogged, leakage at the stuffing box occurs, because of the extra pump pressure that acts upon it. Asbestos-graphite string packing is the best material to use

\* \* \*

## Oxygen Generating Device.

Is it possible for you to publish in an early issue of your magazine some method of preparing oxygen to be used for removing carbon. My garage is located in a position to which it is next to impossible to convey a tank of oxygen without big expense.—H. R., Wyo.

A very simple method of generating oxygen is shown in the accompanying diagram. A mixture of potassium chlorate and manganese dioxide (about 3 to 1) is placed in a container and heated. The container



Simple Oxygen Generating Device.

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

should have a very tight fitting cover and a non-leak hose connection at the top in order to prevent leakage of the gas.

The oxygen given off proceeds through the rubber hose into the torch, which should be provided with a trigger valve. Obviously the flame is made then at the end of the torch, this flame being placed over the carbonized area.

\* \* \*

## Jumping Gear Shifter Lever.

What causes the gear shifter lever of a car to jump out of gear? It does this generally when the car is accelerated.—D. F., Ill.

This trouble may be due to the shifter rod plunger being worn or the spring back of it being weak. This plunger is found at the end of the transmission case, right above the shaft, which the shifter lever moves. Or the trouble may be caused by the main-shaft front bearing being worn or out of adjustment, by one of the shafts in the transmission being out of alignment, or by worn gear teeth.

\* \* \*

## Renewing Leather Upholstery.

What is a good way to renew leather upholstery?—D. S., Cal.

Clean the upholstery with a sponge moistened in mild soapsuds and dry with a chamois. When it is thoroughly dry, use a reliable leather dressing.

\* \* \*

## Sulphating.

What is sulphating in the plates of a storage battery and what is the cause?—H. W., N. Y.

Sulphating is a whitish scale which forms over the plates of the battery, and a plate covered with this scale becomes inactive and incapable of being charged. This scale is a non-conductor of current.

The conditions under which the scale is likely to form are: Storage battery left uncharged for some time, overdischarging, over-strong electrolyte, or charging rate too low.

\* \* \*

## Battery Trouble.

One of our customers is having persistent trouble with his storage battery, although he is careful to keep the liquid up to the proper level. Do you think the generator can be the cause of the trouble?—F. G., Me.

The trouble probably lies in the fact that the generator is not set for the correct charging rate for the particular service demanded of the car.

He may be driving a great deal at night, consuming current for lighting, starting often, and the generator is not supplying enough current to keep the battery up to the mark.

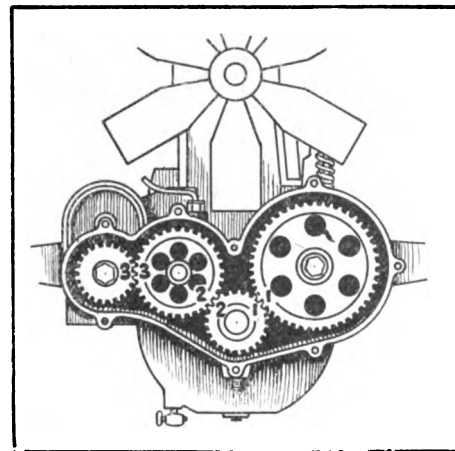
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## Remeshing Timing Gears.

Enclosed is a stamped return envelope. By return mail please send me details necessary to re-mesh the timing gears of an Overland car.—J. D., Mich.

Proceed as follows:

Turn the flywheel until pistons 1 and 4 (see accompanying illustration) are on the upper dead center, with No. 1 ready to fire. As shown in the sketch, No. 1 on the camshaft gear will mesh with No. 1 on the crankshaft gear. Next, the idler gear is to be replaced so that No. 2 on the crankshaft gear comes into mesh with No. 2 on the idler gear. Finally replace the magneto gear so that its No. 3 meshes with No. 3 on the idler gear.



The Way the Timing Gears Mesh.

### Storage Battery Manufacture.

I have started the manufacture of starting and lighting storage batteries. What proportion of red lead and letharge do you recommend for a plate? Is it better to use the paste as dry as possible or wet enough to paste easily; also do the regular wood separators work satisfactorily in forming?

Are there any books published on the manufacture of storage batteries?—J. A. H., Ala.

In regard to the preparation for the mixture for the plates take one-half red lead, one-half letharge, mix with one-twentieth (by volume) ammonium sulphate.

After preparing the grid, mix into a stiff paste with distilled water, pasting it quickly onto the grid and setting it under pressure. After the paste is wet, the operation has to move very rapidly as the mixture is in reality something like cement and sets very quickly. The paste should be laid evenly over the plate and subjected to pressure so that it is solid and all voids eliminated.

The plates should be allowed to dry and should then be set up in jars with standard electrolyte and plain lead plates, forming a couple. Charging current should then be sent into the combination at the rate of one ampere for every 40 square inches superficial area of paste plate.

During this operation the plates should be connected with the negative terminal of the charging source, and the plain lead plates to the positive terminal. This will reduce the pasted plate, in time, to a solid plate of spongy lead.

The plain lead plates and the plates which have been reduced to spongy lead may then be dissembled, and the spongy lead plates re-assembled in their proper relation and charged at the rate of one ampere for every 20 square inches superficial area, positive plate, only. Those plates which are used as positives will be oxidized and will turn a rich chocolate brown in color, while those which are used as negatives will remain spongy.

When the voltage and specific gravity cease to rise for a period of one-half hour, charging progressing at the rate given, the battery may be placed on discharge at the rate of one ampere for each 15 square inches superficial area, positive plate. When the voltage of the cell discharging at this rate has fallen to 1.8 volts, the discharge should be stopped and the cell should be immediately re-charged. Maximum capacity will be produced at about the third or fourth discharge.

Special wood separators, having grooves to facilitate the rising of the gases, are used in forming. Sometimes glass rods are used.

In the August issue of the AMERICAN GARAGE & AUTO DEALER will be found a review of the book "Automobile Battery Care and Repair," which contains considerable practical information relative to batteries and their care.

Another book which is quite complete is "The Automobile Storage Battery, Its Care and Repair," published by the American Bureau of Engineering, Chicago. The first section of the book deals with bat-

teries in general and theory of operation, also hints are given on how to take care of the automobile battery and locate and remedy troubles. The second part of the book describes the work shop and its equipment, battery rebuilding and special instructions relative to particular makes of batteries. The final chapter describes farm lighting batteries.

\* \* \*

### Repairing Scored Crank Shaft.

Can you tell me the best method of treating a crankshaft that has been scored by a broken bearing? It has been ground down somewhat with emery paper, but several deep grooves remain. Is it necessary to remove these entirely?—H. F., Ga.

If the scoring is quite deep, it will probably be a good plan to have the shaft centered in a lathe and turned down enough to give a perfect surface, but if the score is only shallow, it can readily be ground out in a rotary grinder.

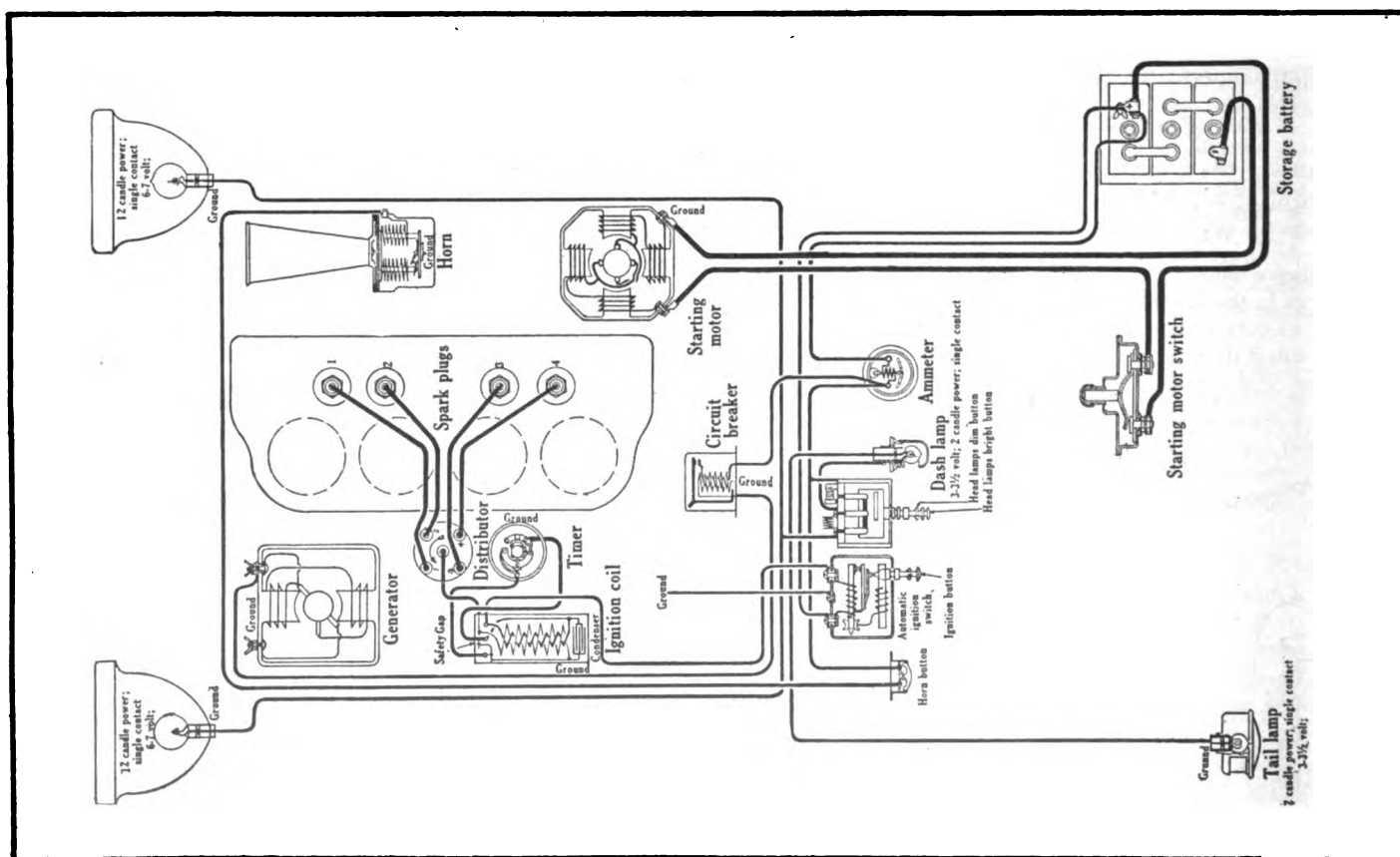
You will hardly be able to obtain good results with emery cloth, and are likely to leave the part out of true. The score should be entirely removed and the part brought back to perfect condition before a new bearing is fitted.

\* \* \*

### Overland Wiring Diagram.

Will you please publish a wiring diagram of the Overland 90 in one of your early issues?—P. W., Mich.

On this page you will find the wiring diagram which you request.



The Wiring Diagram of the Overland 90.



# The Selling of Winter Accessories

Success in Selling Seasonable Accessories Depends Upon the Dealer's Selection of Stock With a View to Selling Customers What They Really Need—When He Has That Stock, Aggressive Advertising Does the Rest

By F. H. Sweet

The successful selling of seasonable accessories depends upon two things, according to big Dave Loth, a successful local dealer. They are: "Stock up with what you really want—and sell the customer what he really needs."

If the customer doesn't know what winter accessories he needs, it is up to the dealer to advise him. Often an automobile owner is inexperienced and should be given useful tips by the accessory dealer.

Big Dave has been selling accessories on his own account for the past six years. Each year has recorded an increase of turnover. Already this year's records in those lines that may be styled "Fall and Winter Accessories," prove that the business is increasing. And this, let it be emphasized, when there are more dealers handling the lines than ever there have been since automobiles became so numerous as to demand that many dealers handle repairs and supplies for the upkeep of these cars. "We are all getting good business," said Big Dave, "and there is a big future ahead."

"For two thousand or twenty-five hundred," declared Dave, "a good stock of accessories can be bought. And the best way, if the dealer has confidence in the salesman, is to let him select a stock that will suit his needs. Of course, this depends upon the salesman being fair with his customer."

There is much soundness in this suggestion, for the automobile dealer who has not handled accessories, will not know just what he requires, while the traveling man, having sold others along the line for several seasons, and being conversant with their sales, is in the best position to help the dealer in his selections.

Such a plan, if adopted, would quite probably overcome a stocking of unsalable lines which would only keep good money tied up. Therefore, even a somewhat more modest beginning could be made than that suggested, the extent of stock being determined, quite naturally, by the conditions of the place in which one is located.

The use, and quite naturally the sale, of automobiles is increasing every year. "Oversold." What a distasteful word that has come to be for the man who wants stock; for the man who has orders either in hand or to be had for the going after; for the live-wire merchant who has, indeed, had few quiet months during the past

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## KEEP BUSY.

"I have never had time, not even five minutes, to be tempted to do anything against the moral law, the civil law, or any law whatever. If I were to hazard a guess as to what young people should do to avoid temptation, it would be to get a job and work at it so hard that temptation would not exist for them."—Thomas A. Edison.

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two or three years. And, from the best-authenticated sources, the demand will not only continue; it will increase—that is, if the capacity of the motor car makers can be increased so as to meet the seeming unceasing demand.

Big Dave, in developing his business for automobile accessories, has issued what he calls a "Winter Catalog." This contains illustrations of such lines as are required by the automobile owner. Dave states that, with three or four exceptions, the lines shown are real necessities.

Aside from tires, which are always seasonable, there will be a big sale for warm robes. Non-skid chains will be a big seller, also lifting jacks. An extensive demand is bound to develop for trouble lamps and bulbs for them, and for headlights, tail-lights, etc. A line of radiator covers, the extent of which will depend upon the probable trade to which one may cater, will prove to be a good profit-yielder. Then follow windshield wipers, side, rear, and front curtains, celluloid for windows, electric radiators and foot warmers, charcoal heaters, driving gauntlets, packings, oilers, etc.

One of the best sources of turnover is that afforded by oils. The dealer can easily secure a reliable line

of oil which will prove good advertising—that is, if he can offer his customers a brand of oil of uniform good quality. Graphites, non-freeze radiator compounds, etc., all come under this head. And there are, in addition, the many kinds and grades of tools, including pliers and wrenches. Added to these, packings and various nuts, washers, copper gaskets, and many other staples, as well as some special lines, will be in regular and steady demand.

In getting after winter accessory business, two things are very important. Big Dave, himself, realizes the importance and value of good window displays, and he spends a considerable amount of money in this way.

If you have the prospects passing your window, that's the time to seek their interest. The window is an excellent medium, and as you must pay your rent for the store, make its "face" so attractive that the buyer will have the very best excuse in the world for entering your store and making the purchase. Then there is the advertising. This must be made as effective as possible, and the plan of hitching to this "Winter Accessories" caption will appeal to many. To use the words of Big Dave again:

"Some think that we ought to create a demand on the part of the consumer, and then he will buy, instead of the dealer getting out and showing the car owner what he needs. There are many things that can be sold which will readily meet the wishes of the car owner if they can be shown him. Through pointed, effective advertising, great improvement of sales can be effected, and it is now the eleventh hour, so to speak, if the dealer has not already mapped out his campaign."

Big Dave is one of those who is convinced that in the immediate future lies an opportunity for the aggressive dealer to exert his initiative, and to secure business for the going after which will yield excellent profit. The accessory dealer has a mine-field before him which only needs consistent, relentless mining, to reveal the hidden profit nuggets.

## WELDING, CUTTING AND BRAZING PRACTICE.

(Concluded from page 27.)

soon as it congeals sufficiently, the shaft is turned over to bring the first groove upward again. The second half of this groove is melted and filled, a layer at a time, until a surplus of filler metal is rounded over as indicated by the dotted lines in Fig. 3.

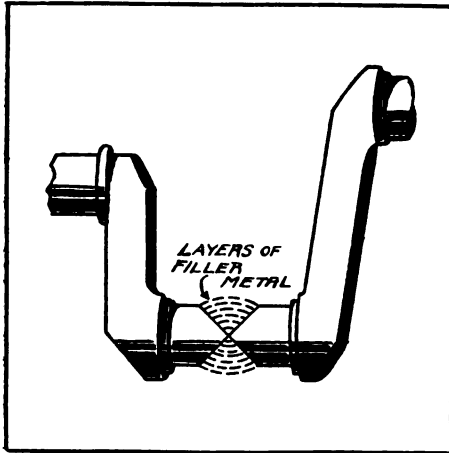


Fig. 3—Second Half of Groove Is Melted and Filled Until Surplus Is Rounded Over.

This also indicates the different layers by dotted lines. In adding the different layers, it is scarcely necessary to say that each one is to conform to the rounding shape of the crank.

While adding the new metal of the different layers, the welding flame and filler rod are manipulated as has been described, the operation being as near continuous as possible and the rate of welding as rapid as compatible with good practice. This speed of welding is assisted on crank jobs the same as other welding, by heating the weld previous to commencing to weld, and keeping it hot by other means than the welding flame during the entire process.

It is obvious that the groove will melt and

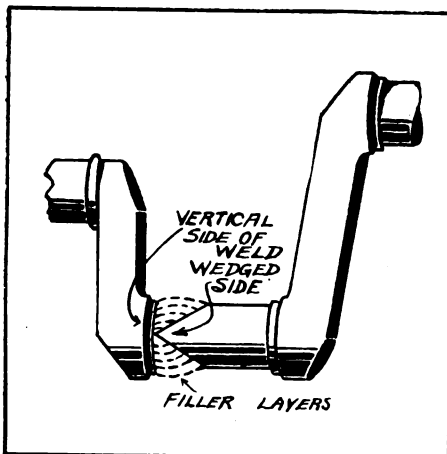


Fig. 4—Most Common Location of Fracture—That in Shoulder.

weld easier and faster if it is red hot before the flame is applied. Wherever possible, therefore, the section of the crankshaft containing the groove should be preheated, some sort of gas or oil burner being used for the purpose.

In lieu of a preheater, the welder will find it helps to use a "heat reflector" for confining the welding heat. This reflector is merely some squares of asbestos so placed as to throw back the radiated heat of the weld, confining and thereby intensifying the heat of the weld. The heat may be further confined on large shafting by keeping wet rags close to each side of the groove. These rags are wrapped around the shaft to prevent loss of heat through conduction. At any rate, the heat is closely localized, the danger of oxidizing is less because the operator may use a smaller torch carrying a milder flame.

A second and, perhaps, the most common location of fractures is shown in Fig. 4. This break, being located in a shoulder, makes it a little more difficult to weld, due to the fact that one side of the V-groove is almost straight, which requires more care in fusing and mixing to make a strong bond with the filler.

The filler metal must be piled up a layer at a time with the end of each layer melted into and joining the vertical wall. Just enough and no more of this wall is melted to receive the filler. If too much is melted, it will tend to drip or run down over the layer, thus clogging the weld and causing poorly-connected spots that sometimes occur unnoticed by the operator. Often while endeavoring to keep from melting too much, the welder will not melt deep enough; he will not permit the heat to soak in enough to make a perfect bond. The roots of the filler are not planted deep enough in the soil of the fracture.

If the journal is broken exactly at its juncture with the shoulder only, the journal is wedged while the shoulder part is merely cleaned. The amount of wedging is about the same as half of the groove shown in Fig. 3. This wedging is done in either of the ways described.

The aligning of a fracture located in the shoulder is possibly harder to accomplish although it is no more essential. It is done by either of the methods suggested or any method suited to shop conditions. At any rate it should be trued up as near as possible and spot-welded before attempting to weld. In this, the average shop will find the V-block system the handiest, but in absence of V-blocks, the operator will find that pieces of angle iron are a good substitute.

The filler metal is added about the same as in the other weld except for the portion adjoining the perpendicular wall. A surplus metal is added for machining stock. The flame and filler are manipulated in the same manner, accompanied by care to see that neither metal is permitted to oxidize. No flux is employed on either of the welds described here, while the reflector is utilized for all.

A fracture that sometimes occurs in automobile crankshafts is indicated in Fig. 5, which shows the comparative extent and amount of grooving, also its location. The

layer method if building up the filler metal is indicated by dotted lines, as is also the surplus.

This fracture is welded in a manner so near like the others that details are unnecessary. The torch welder can apply the fundamentals of the other two welds with little

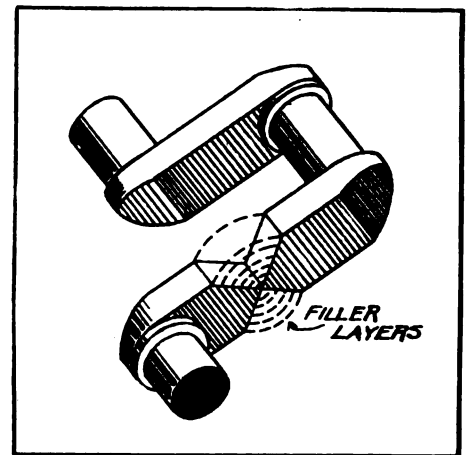


Fig. 5—Fracture That Sometimes Occurs, Extent and Amount of Grooving.

fear of mistakes. It may be well to caution the welder to make allowances for shop conditions. Keep in mind the characteristics of steel; keep working steadily onward; keep the flame neutral—these are the essentials of good crankshaft welding.

## Farm Journal Makes a Plea for the Country Storekeeper.

An article in the September issue of the Farm Journal entitled "Save the Country Storekeeper," is extremely interesting.

The article points out that since the advent of the automobile, farmers do their buying at the cash stores in the neighboring cities, forgetting the helpful service which the country storekeeper has often rendered and forgetting the "hurry orders at rest on the storekeeper's charge account."

"Why don't you ask them for money?" says one of the characters to the country storekeeper.

To which the storekeeper answers: "Oh, you can't do that in the country. The folks here are all like one big family. If you offend one, you offend them all."

The article concludes as follows:

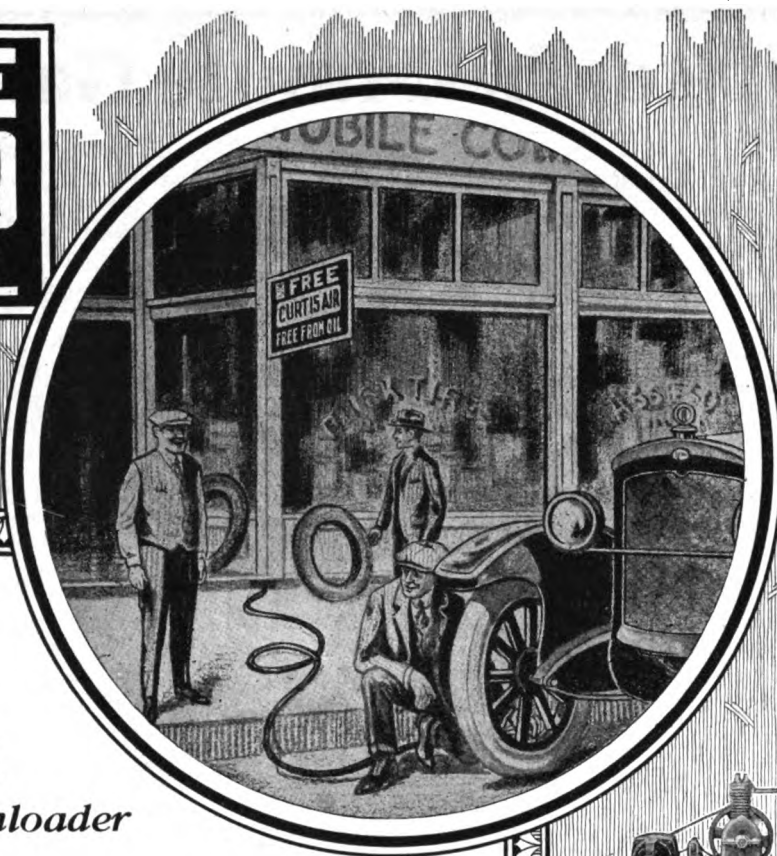
"We can't get along without country storekeepers. Let's patronize them and treat them right. Tell them what you need and will buy from them, and they will be glad to keep it in stock for you. Help your country storekeeper to develop, and you'll find him a big convenience and asset to the community.

"A good real store is an absolute necessity to every community that wants to get ahead—it is the harbinger of better farming, better profits and better living. It is a treasure without price, to be obtained through individual thoughtfulness and co-operation. Build up your local store."

Isn't it so?



The Curtis Sign is 10x14 inches—baked enamel on steel. Furnished FREE with every Curtis Garage Air Compressor—cannot be had in any other way.



## Starts Against No Load

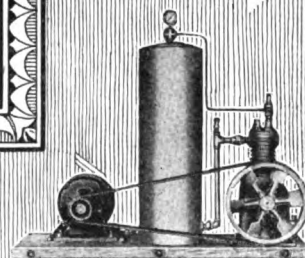
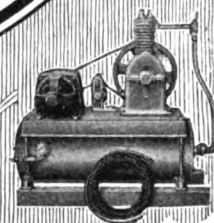
### *Curtis Centrifugal Unloader*

An exclusive CURTIS feature that is incorporated in all CURTIS Automatic Starting and Stopping Devices of  $\frac{1}{2}$  H. P. and larger. Purely mechanical—load never thrown on except at safe running speeds—automatically guards against blowing fuses, burning out armatures, burning up belts, stripping gears and other dangers resulting when motor is started against the back pressure of the air load.

CURTIS Compressors are furnished in five sizes, also made up in stationary and portable motor driven outfits, any of which can be furnished with CURTIS Automatic Starting and Stopping Devices. Ask your jobber for prices and particulars, or write us.

**Curtis Pneumatic Machinery Co.**  
1515 Kienlen Ave. : : St. Louis, Mo.

Branch Office:  
530-U Hudson Terminal, New York City



Curtis Pneumatic Machinery Co., St. Louis, Mo.

1515

Send me particulars on the Centrifugal Unloader, also full information and prices on Curtis Air Compressors.

Name .....

Address .....

Jobber's Name .....

Address .....

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Up-to-the-Minute Garage Equipment

## Flexlume Oplex Day and Night Signs for the Garageman.

"How the Automobile Field is Using Oplex Signs," is the name of an interesting booklet just issued by the Flexlume Sign Co. It features in an attractive manner the ways in which garagemen and dealers are utilizing electric signs.

The distinguishing mark of a Flexlume-Oplex sign is raised letters of snow white glass. These raised white letters stand out from a dark background, making the Oplex sign a fine day sign as well as an electric night sign.

The most easily read combination, says the manufacturer, is raised white letters on a dark background. This is the daytime appearance of an Oplex sign and Flexlume designers have learned by years of experience how to produce outlines, designs, and color combinations to suit any need.

When the lights are on at night, the dark background blends into the darkness, so that the raised glass characters which compose the reading stand out like solid letters of light in the darkness. The body of the sign is composed entirely of metal. The finish is in baked enamel. Almost any combination of colors can be supplied.

Any trade mark or trade name can be reproduced in the raised Oplex characters. A number of stock signs intended especially for garages are kept ready and the

more simple ones are said to be quite inexpensive.

Copies of the booklet, "How the automobile field is using Oplex signs can be had by writing the Flexlume Sign Co., Niagara St. & Potomac Ave., Buffalo. Mention the American Garage & Auto Dealer when writing for copies.

## Less Labor, Less Time, Less Expense with the Akkurate System.

Old-fashioned methods of bookkeeping add to the expense, to the time, and labor of each day's business transactions.

The Akkurate auto bookkeeping system manufactured by the Accurate System & Manifold Co., Inc., will have a particular appeal to the busy, up-to-date garageman and dealer as it is so simplified that practically anybody with ordinary common sense can keep this set of books correctly.

In one looseleaf book, no larger than the old-time ledger, a record of purchases, sales, cash receipts, cash disbursements, purchase ledger, journal, general ledger, trial balance, and periodical business statement can be kept. These sections mentioned are separated with leather tabs, stamped in gold letters, making it easy for the eye to locate the section desired. The weight is about 10 pounds. The size of the book when closed is about 10 inches by 13 inches.

At the end of each month, the Akkurate

system shows the exact condition of finances, whether the business man is making or losing money. And it simplifies the problem of making out an income tax statement.

For the convenience of garages, automobile and accessory dealers, repair shops and service stations, is a loose-leaf ledger that is self-indexing, showing all accounts under the same initial letter at one time, each account individually tabbed. No fumbling of the pages is required.

The Accurate System & Manifold Co., Inc., also makes special forms for



The Loose Leaf Volume Simplifies the Work of Bookkeeping to a Minimum.

keeping records of individual sales of each day, which show the amount of each class of merchandise sold; a perpetual stock system which shows in one complete book the exact amount of stock used and what it was used for; garage register for recording all transient cars stored in garages, night report record sheets for checking cars stored in garages each night; and tire stock sheets for recording tires and tubes bought and sold.

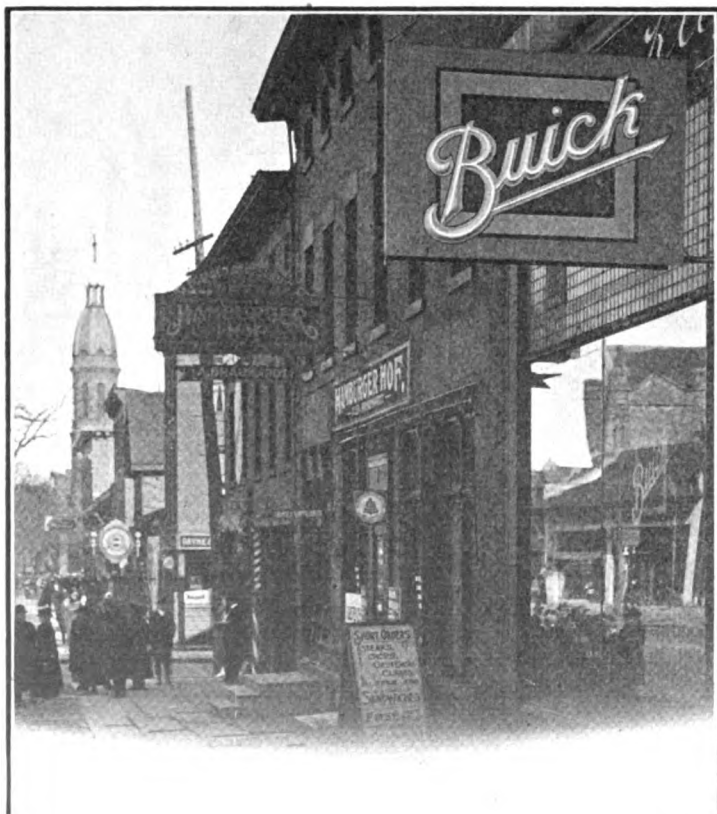
Upon request, the manufacturer will send a booklet on the Akkurate bookkeeping system which will give a clear conception of the many advantages of using this method of bookkeeping. This booklet is a miniature reproduction of the actual Akkurate volume "posted up" with examples of practically every transaction calling for bookkeeping entries that are liable to occur in the business of automobile and accessory dealers, garages, repair shops and service stations.

Write to the Accurate System & Manifold Co., Inc., 403-5-7 Broome St., New York City, for copies of the booklet and further particulars. Mention the American Garage & Auto Dealer when writing.

## New Halburn Adjustable Reamer with Special Service Features.

Speed, strength, accuracy and saving are points of value claimed for the Halburn adjustable reamer—an improved valve-seat reamer with a wide range expansion.

The tool is quickly adjusted to dimension by the turning of two nuts. The cutters are then locked into position by turning one of these nuts. A simple, quick operation.



Any Trade Name Can Be Produced in Oplex Characters—The Raised White Letters Stand Out from a Dark Background—A Good Day Sign and a Good Night Sign.



# When Springs Break ~ put on **VULCAN** *The Replacement Spring*

**Ford Owners  
of America:**  
When Your Springs Break  
put on **VULCAN**  
*The Replacement Spring*

No. 2000  
Regular VULCAN  
Ford Front  
**\$3.50**  
(East of Rocky Mts.)

No. 2001  
Regular VULCAN  
Ford Rear  
**\$10.75**  
(East of Rocky Mts.)

No. 2004  
Special VULCAN  
Ford Front  
for Delivery Cars, Trucks, Taxis, etc.  
**\$6.25**  
(East of Rocky Mts.)

No. 2005  
Special VULCAN  
Ford Rear  
for Delivery Cars, Trucks, Taxis, etc.  
**\$16.50**  
(East of Rocky Mts.)

Ask your dealer for a VULCAN spring  
for your Ford car—our VULCAN  
name plate on every one.

These springs are the expression of our  
highest ideals of careful workmanship.  
Quantity production and organized  
distribution enables us to put them  
in your hands at prices that are  
attractive. Ask for VULCAN  
and demand that our name  
plate be shown you.



**Jenkins Vulcan Spring Co.**  
Richmond, Indiana.



VULCAN has challenged the world's  
attention. VULCAN is fully meet-  
ing the demand for good springs—  
for all cars.

**NEARLY HALF OF THE WORLD'S  
CARS ARE FORDS.**

On October 9th our VULCAN Ford  
line will have been laid before the  
world's Ford owners in

***The Saturday Evening Post  
Literary Digest  
Collier's and  
Leslie's***

with a combined circulation of five  
million.—This campaign will be  
faithfully carried on.

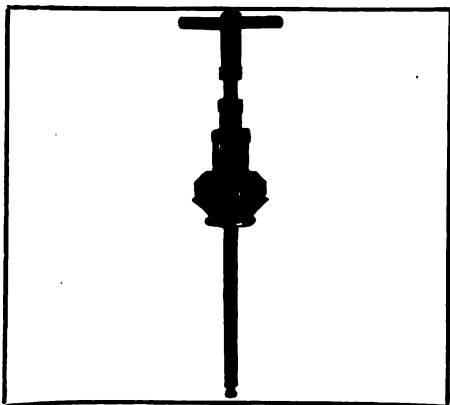
You may expect a sustained and  
growing demand for VULCAN  
Springs—our name plate on every  
one.

Most good jobbers are prepared to  
supply your VULCAN requirements,  
and at prices to yield you a most  
agreeable profit. We advise you to  
show prominently our VULCAN dis-  
play rack (FREE) with an assorted  
stock, especially of these Ford  
numbers.

**Ask your jobber for VULCAN  
Springs, and insist on our name  
plate on every one.**

The construction is designed for strength. The cutters are properly hardened and of ground tool steel, that slide in a slot having a 45-degree base. This brings the pressure against the solid body of the tool making it impossible for the cutters to flip out, and giving the same effect as a solid tool.

Owing to the cutters seating in a 45-degree slot, the pressure drives them



The Halburn Adjustable Reamer Has Been Built for Service.

toward the center, preventing the cutters from getting out of alignment. The center stem is solid throughout. The pilot stems are interchangeable by slipping them over the solid stem. A cross-bar wrench is supplied so that the pressure will be directly over the center of the tool. The tool can be lowered through a small port-hole and expanded after it is inside the port.

This one tool takes the place of four sets of solid tools at the saving of over 80 per cent, says the manufacturer. The 45-degree cutters are specially designed to cut all regular 45-degree valve seats. The base is 1 1/16 inches.

Interchangeable cutters for 30 and 60 degrees and concave cutters for the Ford tractor can be supplied at slight cost. The cutters are quickly sharpened, making them as good as new.

The Halburn adjustable reamer is supplied in a handsome box with full instructions. Two sets of 45-degree cutters, 5/16, 7/16 pilot stems and wrench are included.

Write to the Halburn Co., 317 West Pico St., Los Angeles, Cal., for illustrated folders and mention the American Garage & Auto Dealer when writing.

### Quick-Changing Automobile Signs for Garagemen and Dealers.

Many times you have the very thing a customer wants but let him pass by without telling him about it. The best way to let the world know what you have to offer is by means of a sign.

The W. L. Clark Co. is manufacturing Unitype signs for this very purpose. They are of metal with interchangeable letters, so constructed that any wording or arrangement of letters can be set up quickly and easily and changed at will without any

additional cost after the first purchase price.

These signs are extremely simple and easy to operate, attractive, clean-cut and clear. They are sanitary and easily cleaned and practically indestructible. There is a perfect alignment of letters which are lithographed on metal and any letter may readily be changed or removed without disturbing any of the others. The various different sizes of letters can be used in connection or in combination with each other.

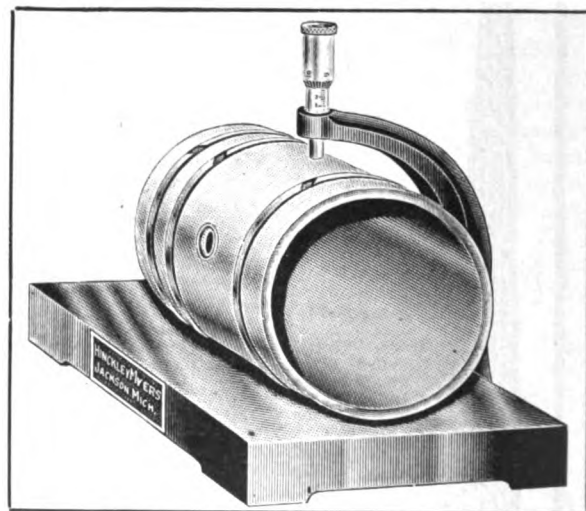
Sign surfaces are made of a special velvet-finished metal, enameled and baked. Each unit bar on which the letters are hung is entirely separate, preventing the collection of moisture and thus avoiding rust.

Unitype patents insure perfect alignment of letters and even smooth sign surfaces. The backs of all Unitypes are neatly covered with the velvet finish metal and each is equipped with a wire easel or brass hanger plates for wall use.

Frames include both wood and metal. The regular finishes in wood are mahogany, oak, white enamel and gilt. Other wood finishes are made to order. Metal finishes include mottled bronze, statuary bronze, oxidized copper, gun metal, black and polished bronze on pure copper, polished brass and frosted brass.

Unitype letters are lithographed on metal with baked enamel finish. Each size of letter is packed in a box with separate compartments for each letter. The sets are made up in carefully and scientifically apportioned assortments like a printer's font of type and include letters, numerals and

With the Piston Micrometer, Gage and Surface Plate Fixture a Mechanic Can Determine the Exact Diameter of a Piston.



### New Piston Micrometer, Gage and Surface Plate Fixture.

To produce repair work in an economical and efficient way, the Hinckley-Myers Co. is introducing its piston micrometer, gage and surface plate fixture which is designed for checking piston diameters. With it a mechanic can determine if the diameter of an oversize piston varies from the marked oversize.

This fixture is said to provide a quick and accurate method of obtaining the exact diameter of a piston. The micrometer works to a thousandth of an inch.

The cutter blades of the Hinckley-Myers adjustable cutter-head reboring machine, which is well known to the trade, should be set for the proper size indicated on the micrometer. This insures a perfect fit of the piston in each cylinder rebored. Oversize pistons frequently vary from the marked oversize and they should be checked to ascertain if they are not larger at one end. Any high spots can be turned off in a lathe until the fixture shows the piston to be true.

The frequent variations from marked sizes of oversize pistons has made it necessary to use a cylinder reboring machine with adjustable cutterheads and sizeometer for setting the blades.

Another valuable feature of the piston micrometer and gage is the bed plate. This can be used as a surface plate. Any part that has to be filed should be tested for level, such as main and connecting-rod bearings.

A piston with a diameter of 3 5/8 and 4 1/8 inches can be tested on this fixture.

characters, divided according to average uses.

Signs are made with black boards and white letters or white boards with black letters. This distinction should be plainly specified on the order. Unless otherwise specified, the black sign with white letters will be sent.

Write to the W. L. Clark Co., 115 Nassau St., New York City, for further particulars.

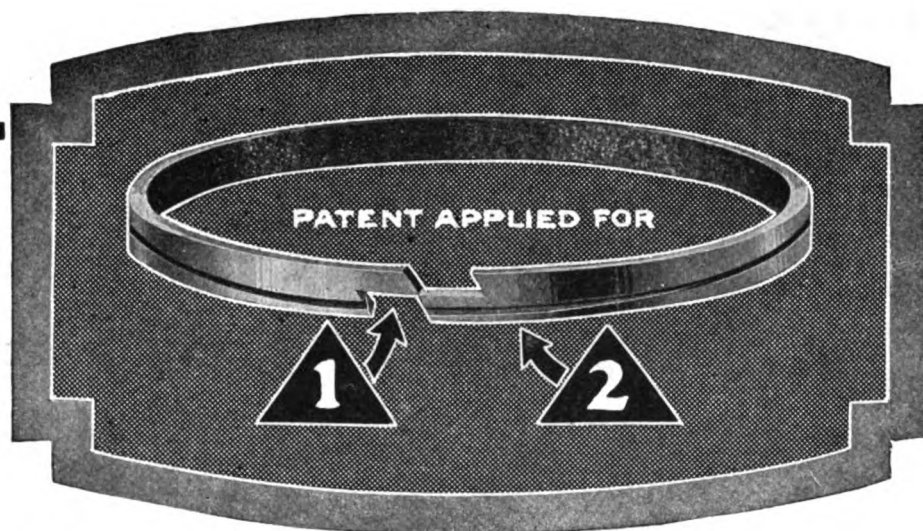
For further particulars write to the Hinckley-Myers Co., 6 North Michigan Ave., Chicago.

### Paragraph.

THE HARVEY SPRING AND FORGING CO., Racine, Wis., makers of the Harvey boltless auto spring, have opened a Chicago branch at 3020 S. Michigan avenue. Here a complete assortment of Harvey springs of all sizes will be kept.



Too little oil provides a feast of metal for friction. The resultant wear courts compression leakages and—



—the passage of excess oil. Too much oil feeds the gluttonous, black giant, Carbon, and presages ring failure.

*just enough Oil*

—starves friction  
—starves carbon  
—holds compression

Controlled oil distribution as introduced by the remarkable wandering oil groove of the General Lightning Cut Ring accomplishes certain definite results.

Its immediate and invaluable function is to subdue friction. This it accomplishes by carrying oil to heretofore unreached high points on the cylinder wall.

The preservation of the ring is of five-fold importance. It halts the appearance of the usual friction created crevices. It checks compression leakage. It starves carbon. It enables the oil scraping edge to return all excess oil to the crank case. It indefinitely postpones ring failure.

\* \* \* \*

The lightning cut itself, combining, as it

1. The Lightning Cut

2. Oil Distributing Groove

RIGHT: Shows shape of oil groove. Note scraping edge.

BOTTOM: Shows upward course of oil groove.

does, the old step and diagonal cuts, provides a most effectual control of the compression charge.

Three other features of design—the individual cast—its concentric shape—and one-piece construction make for maximum piston ring efficiency.

The dealers, repair shop and garage men who have waited for a piston ring they could guarantee to give increased power, greater mileage, fuel and oil economy, and less friction and wear, are invited to participate with others who have adopted our revolutionary, profit sharing sales plan in the marketing of piston rings.

**GENERAL LIGHTNING CUT  
PISTON RINGS**



**GENERAL UTILITY COMPANY**

1324 Ogden St. Philadelphia Pa.

*Utilities that Sell Because They Serve*

Export Department: 17 Battery Place, New York, N. Y.

Western Sales Representatives: JOHN M. STOCKFISH CO., 111 Washington St., Chicago, Illinois.

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Accessories—Dealers' Key to Profits

## A Cotter Pin Extractor Won't Be Amiss in the Tool Kit.

A valuable addition to your customers' tool kit, Mr. Dealer, is a cotter pin extractor.

In an average car there are at least 80 cotter pins used. These pins frequently become rusted or, in the process of repairs, become lost, making frequent replacements necessary.

To get an idea of the extent to which cotter pins are used in the truck or car, the following named parts are a partial list: One pin with drive shaft pinion nut; 2 pins with starter, spring shaft; 2 with inner brake band guide; 4 with outer brake band; 6 with outer brake band support spring; 2 with steering knuckle pin nut; 2 with tie rod bolt; 2 with foot brake rod yoke clevis pin; 1 with hand brake band lever stud washer; 8 with foot and hand brake rod clevis pin; and 1 with steering arm hold.

Thus it will be seen that a cotter-pin extractor will not be amiss in the motorist's equipment. Strongly made from octagon tool steel 90-point carbon Swedish analysis, the Red Devil cotter-pin extractor made by the Smith & Hemenway Co., Inc., Irvington, N. J., will meet the need. For trade prices and further particulars write to the company.

## The Stiles Turnsafe Affords a New Safety in Steering.

"Every Ford driver, as well as every repairman," says the Stiles Mfg. Co., "knows that there is absolutely nothing on a Ford to prevent turning the steering wheel too far to either right or left—causing the steering bolt arm to pass beyond center.

"Accidents and damage often result from

The Stiles turnsafe for Fords, which is being manufactured by the Stiles organization, is said to correct all this by stopping the arm at both right and left extremes just where it should stop. It makes it impossible to turn the wheels too far in either direction—it gives a new safety in steering.

The device is quickly attached. Installation is made in 15 minutes by means of a screw driver and wrench. There are no holes to drill, says the manufacturer, nothing to rattle, nothing to get out of order—the device requires no attention and lasts the life of the car.

The Stiles Mfg. Co. has a rather unique method of marketing which will be found interesting and profitable. It sells to exclusive representatives, territories being arranged on the basis of county, townships, or sections as may be desired. Exclusive territories are being rapidly arranged, both by individuals, accessory dealers, and service station owners.

The company will be glad to hear from anyone interested in this sales plan and will submit its proposition on receipt of information as to territories desired. Agencies will be supported with excellent literature and sales houses.

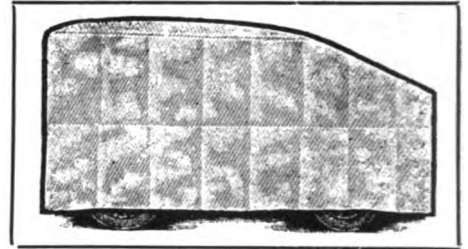
Further particulars and trade prices can be obtained from the Stiles Mfg. Co., St. Louis, Mo. Mention the American Garage & Auto Dealer when writing for further details.

## Automobile Storage Covers Offered as Item for Winter Sales.

The season is here when automobile owners will store their cars. These cars should be protected. To meet the need of an inexpensive and yet efficient protection against dirt, dust, moisture and cold, the

nedy auto covers are a preventative, says the manufacturer. The covers are easily put on and full instructions are labeled on each cover. There is a seven-passenger size bag, a five-passenger size, a Ford special size, and a cover for electrics.

The company also makes a cover of light weight paper without the reinforcements, which is said to give good service where



The Storage Cover Keeps Out Dirt, Dust, Moisture and Cold.

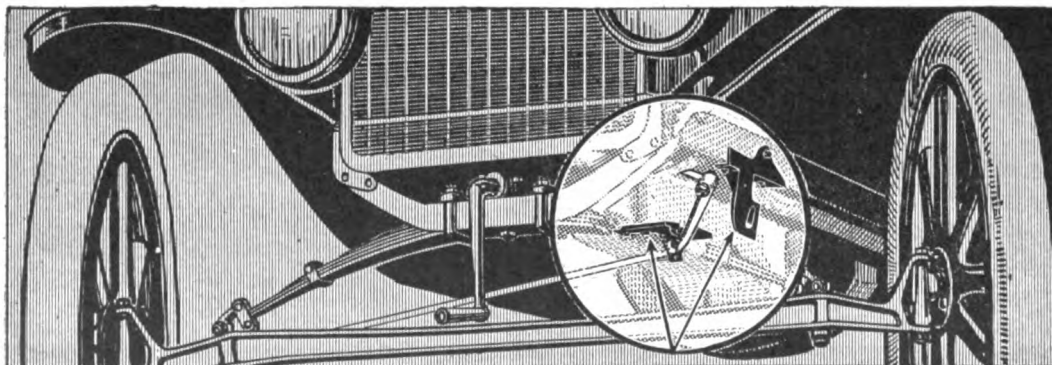
the cover is not expected to be used more than once.

The Kennedy Car Liner & Bag Co.'s home plant is in Shelbyville, Ind., but there is a Canadian branch plant in Woodstock, Ontario. From either factory, further details and trade prices can be obtained. Write for more complete particulars and when writing don't forget to mention the American Garage & Auto Dealer.

## Automatic "Spring Shutter" Radiator Cover for All Cars.

Of interest to the trade is the announcement of the new Nathan patented automatic "spring shutter" radiator cover which is said to be the latest design.

This shutter is operated from the driver's seat and offers one of the best methods of regulating the temperature of the motor, inasmuch as it operates from the bottom up. (Radiators freeze at the bottom first.)



The Turnsafe When Installed on a Ford Gives a New Safety to Steering.

this lack of proper safeguard and protection against possibly the most frequent cause of all Ford accidents. Even if accident is prevented, damage is done for extreme turns bend the steering connecting-rod, throwing the front wheels out of alignment."

Kennedy Car Liner & Bag Co. offers the Kennedy auto storage cover. These covers, which completely cover the car, are made from an especially strong paper, securely reinforced to prevent tearing.

Sudden changes of temperature are conducive to checking the varnish, but Ken-

Motors are designed to run most efficiently and economically at just below the boiling point and radiators are designed to keep their temperatures below that point.

For trade prices address the Nathan Novelty Mfg. Co., 55 Fifth Ave., New York City.



# Are YOU one of the thousands who are doing it BETTER and CHEAPER with

Non  
Drying



Non  
Freezing

## Grinding Compound

Water-mixed "PEP" is producing better valve grinding and saving money in thousands of shops. It seats a valve perfectly in half the time ordinarily required. The job is done in one operation, because you use only one grade of abrasive, which combines the cutting and finishing grades of other compounds. The low viscosity of water allows the particles of abrasive perfect freedom of movement, resulting in an acceleration of friction that finishes the job in one-half the time required with sluggish oil mixed compounds.

"PEP" never leaves telltale rings upon valve and valve seat. Water, being thinner than oil, distributes the abrasive freely and evenly. The finish produced is of that microscopic fuzziness peculiar to the perfectly ground surface. When oil is used, the coarser particles of the abrasive, traveling in ruts, form grooves and rings that are often visible to the eye even after the "finish" is applied.

"PEP" is convenient to use. Only a water dampened cloth is required to wipe the valves before and after grinding. No dry or cracked hands from using gasoline and kerosene.

"PEP" is economical because you use only one grade of abrasive instead of two. Not only is a substantial saving of material effected but

also of costly containers. "PEP" will neither dry out or freeze.

In the interests of BETTER valve grinding and BIGGER PROFITS from this class of work, you owe it to yourself to investigate "PEP". Send in the coupon today, and test "PEP" without cost to yourself.

**WORCESTER ABRASIVE CO.**

1662-1664 Broadway

New York City

# FREE

**TO CONVINCE YOU**  
we will send you a half  
pound can of "PEP"

# FREE

**YOUR JOBBER**

To prove to you the superiority of "PEP", we want you to test it at our expense. When grinding valves you want the best abrasive to be had. Your jobber wants to sell you the best, but he is too busy to make a test of every product offered for sale.

Send this coupon to your jobber for his approval and we will send you postpaid a half-pound can of "PEP" with the understanding that you make a thorough test of this compound and report the results of the test to your jobber.

Gentlemen:

We would like to test "PEP" in accordance with their proposition. Kindly forward to the Worcester Abrasive Co. this coupon with your O. K. so that they will send us a half pound can of "PEP" for testing purposes. We will let you know the results of our tests.

Name.....

Address.....

**JOBBER'S O. K.**

Please send the party whose name is written above, a half-pound trial can of "PEP."



1662-1664 Broadway **WORCESTER ABRASIVE CO.**

New York



### The Felix Oil Cup "Solves Chassis Lubrication Problem."

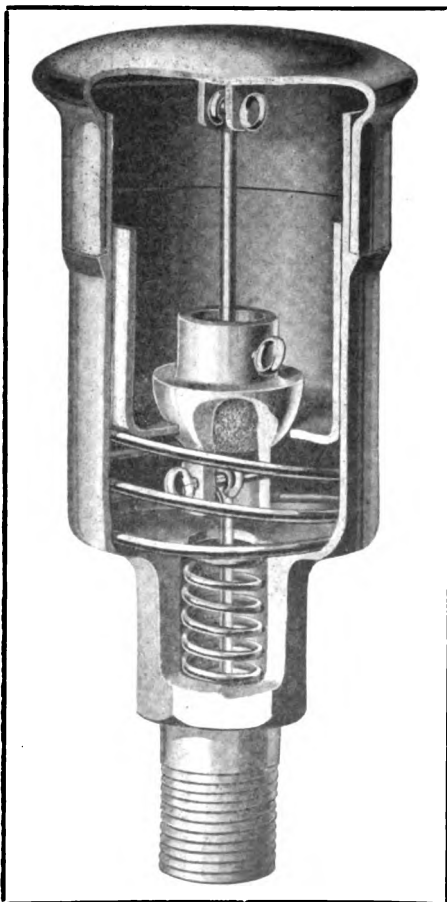
The Felix oil cup, sold by the Cloud Accessories Corp., is claimed to be one of the greatest inventions relative to automobile lubrication.

This cup automatically feeds sufficient oil for lubrication. It need not be filled oftener than once a month. When it is desired, the oil may be forced over the bearing surface by raising the cap and pressing slightly with the hand, and all dirt and grit is flushed out. It is said to be the only oil cup with a combined pressure and automatic feed.

The device is simple in its operation. There are no threads to cross. There is no cap to drop into the dirt. It is only necessary to lift the cap, fill the cup with any oil can and the lubrication is provided for a month.

As the cap snaps into place, there is a flush of oil over the bearings and all foreign matter is removed. The automatic feed then bathes the bearings with a continuous film of oil. The flushing-out operation takes only a moment and it is simple, easy and clean.

"Grease clogs the holes and does not lubricate properly on non-rotating surfaces," claims the Cloud Accessories Corp.



Cross Section of Automobile Lubricating Cup.

"It packs into the cup instead of around the bolt. This causes wear which may necessitate the renewal of the shackle bolt. The ordinary oil cup fails in that the oil immediately runs out.

"With its automatic oil reservoir insuring a constant stream of oil for a month, and with its hydraulic pumping action, which has a pressure of more than 200 pounds, the Felix oil cup is unique."



The Felix Oil Cup Installed on the Chassis.

The cup fits any automobile and is guaranteed by its manufacturer to be unbreakable, dust and waterproof.

The Cloud Accessories Corp., 1408 S. Wabash Ave., Chicago, will send trade prices and more complete details to those interested. Mention the American Garage & Auto Dealer when writing for further particulars.

### Wade Mfg. Co. Produces "The Plug That Won't Carbonize."

Just what you have been wanting for a long time is a spark-plug that is guaranteed not to foul in any gasoline engine.

The Wade Mfg. Co. claims that its improved spark-plug answers these specifications and has recently placed the plug on the market.

The plug was designed with a view to providing a novel means for creating or producing an extremely hot spark which acts with an oxidizing effect, keeping the sparking terminals free from oil or carbon deposits and maintaining the efficiency of the plug at all times. It is claimed to protect the sparking terminals and prevent the accumulation of all foreign substances which interfere with the formation of the proper spark.

The porcelain in this plug is of the highest grade imported Kaolin, which is tested to stand 600 more degrees of heat than is generated in the cylinder of a motor.

The electrodes are made of sub-platinum wire and the manufacturer guarantees that they will not burn, warp, or scale under intense heat.

Further information concerning this plug can be obtained by writing the Wade Mfg. Co., 415 North 4th St., Camden, N. I.

Mention the American Garage & Auto Dealer when writing for trade prices and further particulars

### Sturdy New U. & J. Timer Built on Rotor Principle.

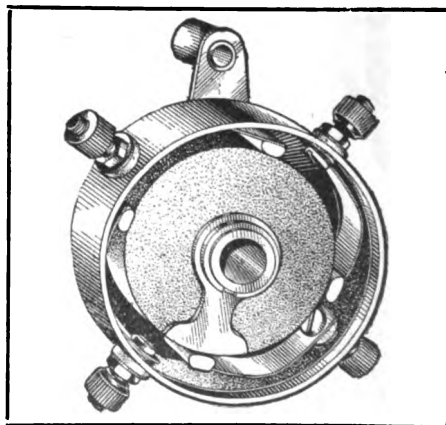
The satisfactory results obtained from the use of the U. & J. timer will be worth many times the price of the device, says the U. & J. Carbureter Co. The U. & J. timer is built on a principle that is new to timers, but which has been proved practical for years in electrical dynamos and generators—namely, the rotor principle.

The rotor is the only moving part of the dynamo—similarly the rotor is the only moving part in the U. & J. timer, as there are no rollers. The rotor of the U. & J. device is made of specially prepared insulating material, so hard, dense and tough that it cannot, it is claimed, gather moisture.

The rotor gives a clean wipe contact, insuring a hot spark to each plug, because the pressure exerted by the contact determined in the design of the timer, remains uniform at all speeds. The result is long life and perfect operation.

With the U. & J., the roller is absolutely abandoned. The contact blocks are set on steel springs that exert a constant pressure. They cover the whole face of the rotor, making groove wear impossible. The springs are high tension and are heat-treated.

revolving inside the contact blocks, all sediment falls into the base of the timer—centrifugal force throws all dirt or grease off the rotor, so that the timer cannot become clogged. The shell of the timer back of the contact blocks is lined with insulating material, making short circuits impossible. The edges of the contact blocks are rounded, both front and



The U. & J. Timer Is Built on the Rotor Principle.

back, so that a reversal of the motor, it is claimed cannot cause damage from backfire.

The whole timer is strong and heavily made throughout.

For further particulars concerning this timer, write to the U. & J. Carbureter Co., 505 West Jackson Blvd., Chicago. Mention the American Garage & Auto Dealer when writing.

# Widen Your Zone of Attraction



Suppose you could get a much better location by simply moving your garage and without cost to you—you would move.

You can improve your present location and at small cost—by placing a Federal Electric Sign in front of your garage, because—

You can reach people a block or two down the street in each direction and also at the cross streets—people who ordinarily never even see your open doors.

A Federal Electric Sign acts as a cheerful salesman, inviting the people to your garage—it creates the impression that you are up-to-date and prosperous. It glistens by day and sparkles by night.

## —9 Months to Pay

You have 9 months to pay for this sign and you get the services of an energetic business booster to help you make the final payments. After that, it costs but a few cents a day for current—no other expense. Made of Porcelain-enameled steel, it cannot fade, rust or rot. An occasional washing keeps it sparkling like new.

Give New Customers a Chance to Find You. Send in the Coupon TODAY, for full information. No obligation.

*Tear Off and Mail Coupon Now*

### Federal Electric Company

*Representing*

**Federal Sign System (Electric)**

8700 South State Street, Chicago

Please send full information on Enameled Steel Sign for my business and your 9-months-to-pay plan. No obligation.

NAME .....

ADDRESS .....

BUSINESS .....

AGAD-10

# "Ready for Buyers"---Sheridan Car

The Sheridan car is in production—at a rate which is expected to result in 10,000 of the four-cylinder and 4,000 of the eight-cylinder cars within a year. The new car, its construction and the excellent facilities for producing it, were demonstrated to a group of representatives of motor publications on September 24, who visited the plant of the Sheridan Motor Car Co., at Muncie, Ind., at the invitation of President and General Manager D. F. Burke.

In the newly-equipped plant, this new unit of the General Motors Corp. is turning out the Sheridan car, a car which has an exceptional number of features that will appeal to all classes of motorists.

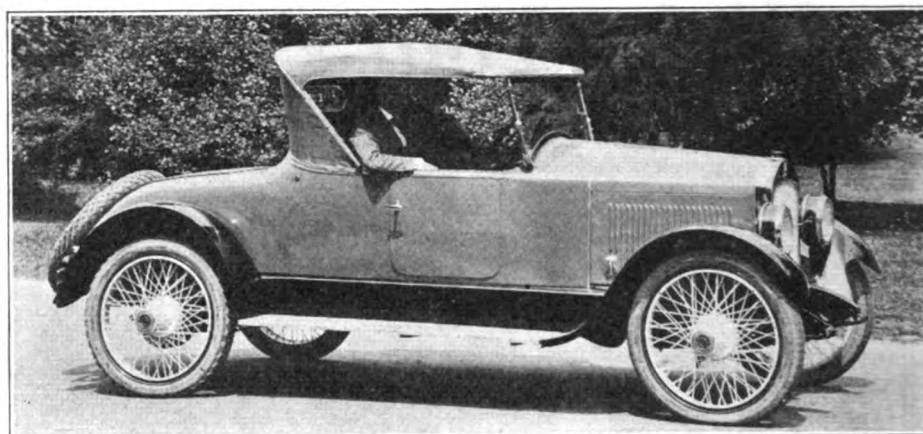
The illustrations of the Sheridan "Four" touring car and roadster show the beauty of the lines. The wheel base is 116 inches, the engine is the Northway four-cylinder overhead valve type, 3 11/16-inch bore 5 1/4 inch stroke. The cylinders are cast en bloc and the valve mechanism is enclosed by a removable cover.

The motor is lubricated by a positive driven gear pump, accessibly located on the end of the generator shaft, which forces oil under pressure to the main bearings. An oil level gage is placed on the crankcase and a pressure gage is on the instrument board. The chassis is lubricated by the Alemite, high pressure, oiling system which eliminates the use of grease cups.

The carburetor is a Zenith with the improved compound nozzle and air is controlled by a regulator on the instrument board.

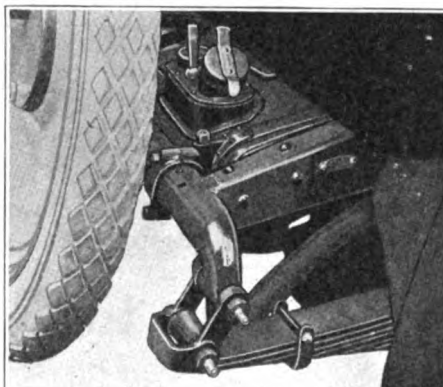
The Autolite electric system of the two-unit type is installed, while the ignition is the new improved Remy.

Transmission is obtained by means of the latest improved dry plate disk clutch with a selective sliding gear having three speeds forward and reverse.



Like the "Four" Touring Car, the Sturdy Roadster Will Have a Wide Appeal.

The drive is left-hand with center control. The engine is water cooled, the equipment consisting of a centrifugal circulat-



A "Closeup" of the Rear Spring Suspension. ing pump, cellular type radiator with improved fan shroud and a pressed steel-fan, belt-driven.

The front axle is of the I-beam type, of special design affording shorter turn-

ing radius and easy riding. The rear axle is a three-fourths floating type and the axle shafts are of chrome nickel steel. The bevel gear and pinion are of nickel steel, while torque tube construction encloses the propeller shaft and relieves the springs of all driving and breaking strains.

The frame is of selected 5/32-inch, high carbon steel stock and 5 1/2-inch vertical section with side members and six cross ties to give maximum strength. A feature of the frame construction is the rear cross member which carries the spring hangers. This construction ties up the rear assembly in one solid bridge-like girth.

The front springs are semi-elliptic and 36 inches long. The rear are semi-elliptic 56 1/2 inches long with 12 leaves 2 1/4 inches in width.

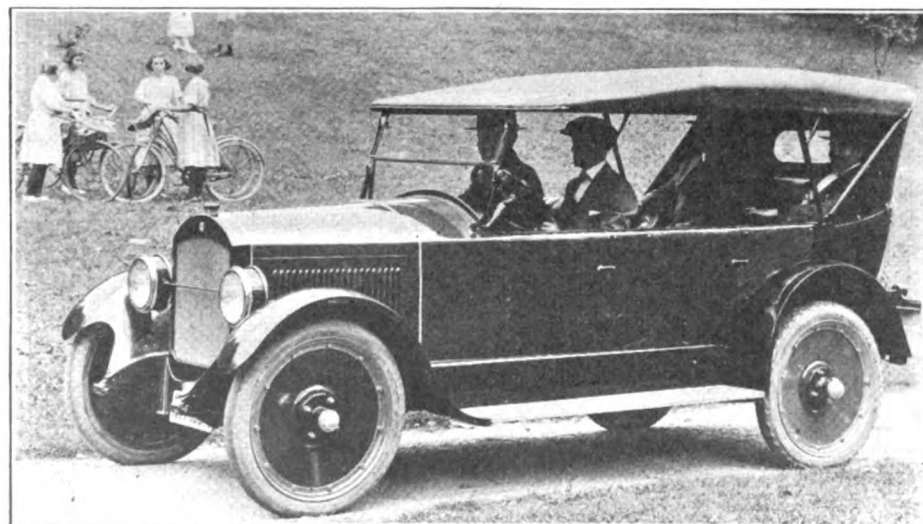
Heavy stroke artillery type wheels are regular equipment, but wire or disk wheels may be obtained at extra cost. Plain tread tires are supplied on front wheels and 33 by 4 non-skid on the rear.

The foot brakes are of the external contracting type and the emergency of the internal expanding type.

A worm and worm-gear type steering gear, fully adjustable, is provided with an 18-inch steering wheel of Circassian walnut, having a special fitting hand grip, with the horn button in the center.

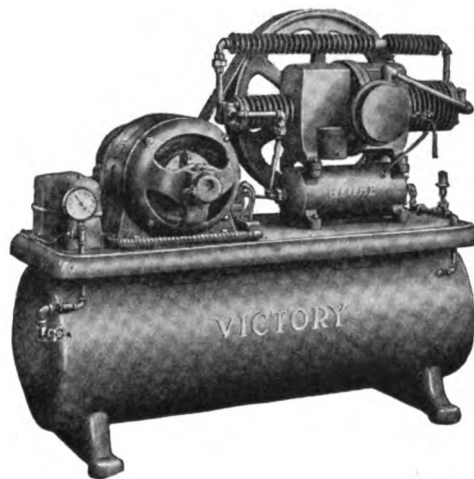
A Stewart vacuum gasoline tank of 18 gallon capacity is suspended at the rear. Two gallons are held in reserve and are controlled by a positive fool-proof valve. The arrangement is shown in one of the illustrations. When the handle of this valve is up, the filler cap of the main tank cannot be taken off, thus insuring that a supply is placed in the auxiliary tank before filling the main tank.

The rain-vision windshield of the ventilating type is of special design, affording clear vision in all directions. It is equipped



The Sheridan "Four" Touring Car Is Beautiful and Graceful in Line.





**"VICTORY" Complete Automatic  
Motor Drive Unit**

# **GLOBE AIR SERVICE**

## **your best advertisement**

A first class air service is the most effective and profitable form of advertising that you can use. Any motorist prefers to stop at a garage where his tires are inflated promptly and properly. Your air service is your first point of contact with a large number of car owners. If the service is prompt and dependable, a favorable impression is made—resulting in profitable business.

When you install a GLOBE outfit you are certain of giving an air service which cannot be excelled—and which will prove a big factor in building your business.

The Globe manufacturers made the first two-stage air compressors, setting a standard that has never been equalled.

Globe Air Compressors meet all the requirements of garage service. They provide ample pressure and capacity for inflating the largest pneumatic truck tires. As these tires are daily becoming more numerous, you realize the need of being able to give them service. Globe Air Compressors are noted for their low operating cost and great durability, as well as the dependable service they always render.

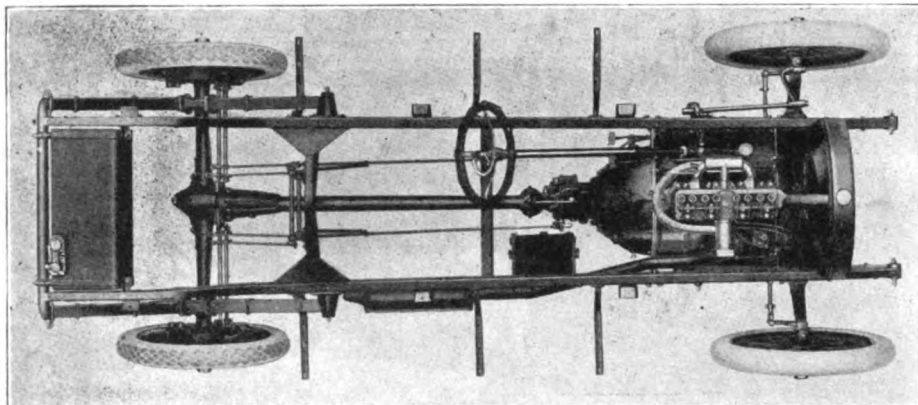
*Write Department A-G for Bulletin.*

## **GLOBE MFG. COMPANY**

**Battle Creek, Mich., U. S. A.**

# **GLOBE**

## *Air Compressors*



The Chassis of the Sheridan Car Is Well Braced With Cross Ties and the Rear Springs Are Suspended From the Rear Cross Bar.

with an improved windshield cleaner, while rubber edging completely surrounds the shield and excludes wind and rain.

A jeweled electric self-winding clock having a two years' guarantee is one of the high-grade provisions of the car. It has the identical movement which was bought by the government during the war for use on submarines.

Other equipment of the car consists of a Stewart-Warner speedometer, motor-driven electric horn, tire carrier with demountable rim, jack provided with an extension handle, pump and complete set of tools which are carried in the left front-door pocket. Side curtains which open with the doors are carried in compartments in the rear of the front seat. There is a folding adjustable foot rest.

The weight of the car is 2,850 pounds and the price of the five-passenger touring and two-passenger roadster is approximately \$1,800, the exact price to be decided later.

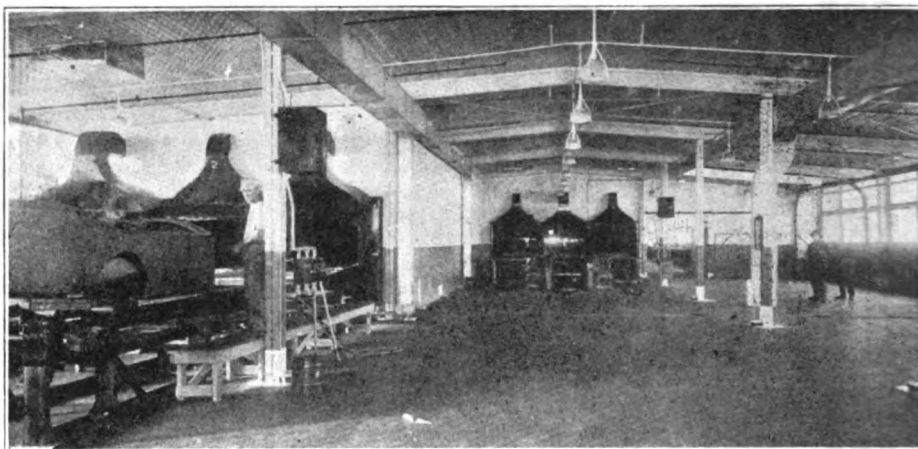
The Sheridan "Eight" has for the present a single body. The wheelbase is 132 inches. The motor is an eight-cylinder high-speed type. The bore is  $3\frac{1}{2}$  inches and the stroke  $4\frac{1}{2}$  inches. L-heads are removable. The cylinder blocks and crankcase are cast in two sections, divided vertically, with aluminum cylinder heads. Other units also differ from the "Four." The Delco electrical system is used for starting, lighting, ignition and generator. The axle is floating type; springs, semi-elliptic.

The frame is of seven-inch high carbon, heat-treated pressed-steel channel, exceptionally reinforced by nine cross members, three of which are of tubular steel. The rear cross member of the frame, like that on the "Four," is tubular and not only ties up the side rails, but provides a rigid hanger for the rear spring shackles. The

Among the other features of the Sheridan "Four," which may be mentioned, are the extreme roominess, the two-gallon reserve tank for gasoline, the high-grade quality of all material used in the construction, the good sensible equipment, the quick pick-up of the engine, and the short radius of turning. Heavy leather is used for the upholstery over a good quality of curled hair. The seat cushions are provided with Marshall type springs, there being 298 separate coils in each cushion, assuring easy riding in combination with the special frame and spring construction of the car.

The facilities provided for the production of the new Sheridan car are the most modern that could be obtained. The latest of equipment is installed throughout the plant and particular attention was paid to the lighting, ventilation and cleanliness.

It is stated that in the production processes no steps are retraced from the time the raw materials enter the factory until



In the Course of the 32 Operations Involved in Painting Car Bodies They Pass Through These Six Drying Ovens, Going Through Two of Them Twice.

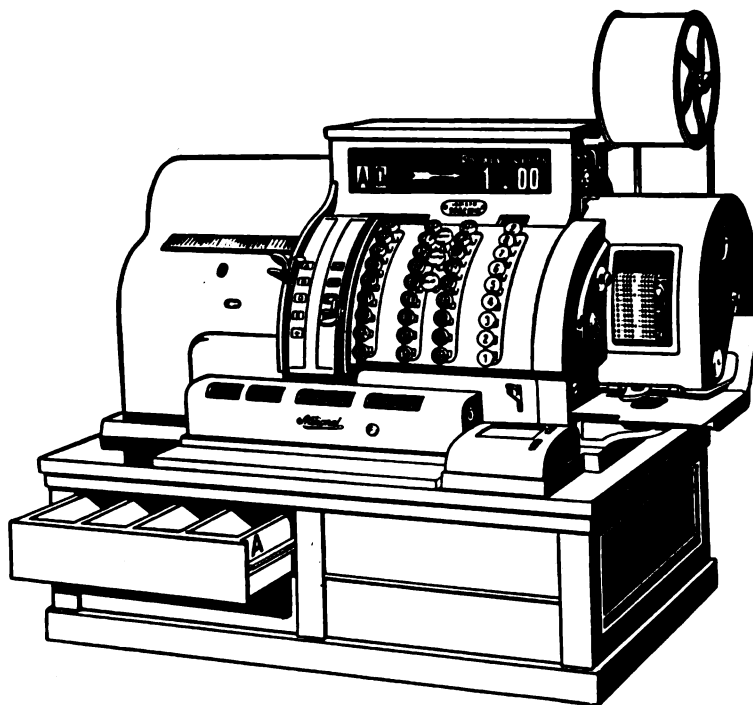
gasolene tank is also fastened inside this tubular member. The cross member, just ahead of the rear axle, is kicked up to allow for a maximum of spring action.

The price of the Sheridan "Eight" 7-passenger touring car is approximately \$3,500, the exact price to be decided later.

the finished car is turned out at the drive away doors or the loading platform. And, by the way, the loading platform is worthy of mention. In addition to being of ample width, it is 1,060 feet in length so that a trainload of cars can easily be loaded with a minimum of time.



Electric Power Driven Equipment and Excellent Lighting and Ventilation Are Features of the Upholstery Department—Car Bodies Are Lowered From the Second Floor Directly Onto the Chassis as It Comes Down the Assembly Line.



## **This National Cash Register will help you solve your "help" problem.**

Interest your clerks in the business and they will work in your interest. Your good clerks will not leave and all of your clerks will become better clerks.

One of the surest ways to interest your clerks in the business is by having a profit-sharing or bonus plan.

The best way to get the necessary figures for such a plan is by using an up-to-date National Cash Register. It gives you printed and added records which show (1) the total sales of each clerk, (2) the number of customers waited on by each clerk, (3) the volume of sales in each department of your business.

**We make cash registers for every line of business. Priced \$75 and up.**

# **NATIONAL**

## **CASH REGISTER CO.**

**DAYTON, OHIO.**

Some of the features worthy of notice in the course of the car's production are the assembly line, the nickel plating department, the car body baking ovens, and the upholstering department.

All the nickel plating of the various parts on the car is done on copper and the nickel plating department is equipped with the latest in electro-plating and buffing facilities.

Assembly work is reduced to a minimum by installing not simply parts, but in every instance, so far as is possible, complete assemblies.

The chassis is painted by the spraying process while in the assembly line and then passes through a 100-foot chassis oven, where the paint is thoroughly dried, in the course of the 45 minutes which are consumed in traveling the oven's length.

The painting department is located on the third floor and is of particular interest, for the finish given the body of the Sheridan car is one of its outstanding features, as it is declared that the gloss is particularly durable and will stand more than the usual amount of exposure.

In painting the body of the Sheridan car, 32 distinct operations are performed, and the bodies pass, as shown in one of the illustrations, through six baking ovens—three for rough stuff, 240 feet long and three for color varnish, 200 feet long. It takes about 2½ hours for a car body to pass through each oven, depending upon the production and the heat.

As shown in one of the illustrations, the upholstery and trimming department, where the leather upholstery is cut and sewed and the curtains manufactured, is well laid out with individual lamps to supplement the general lighting. It might be mentioned that only the best grade of leather and other materials are used.

In a separate building the enameling of parts is performed. This department is equipped with a battery of ovens, electrically controlled, for baking on the enamel. By means of this control a very fine regulation is attained, there being a variation of only five degrees in temperature.

The production parts stockroom is, of course, most complete and systematically arranged.

Another stockroom in a separate building is provided for "service" parts. Here all metal frames and bins are provided for keeping the various service parts.

The shipping department is located at one end of this stockroom and it is expected that all orders for parts will be filled the same day as received. P. H. Stambaugh, manager of service, has been identified with service for the past eight years and was transferred to Muncie from a General Motors' unit in Denver.

Visitors to the newly-equipped plant are impressed with the efficient and modern equipment and the intent of all department heads and employes to use only the best of materials and turn out the highest class of work.

The plant is exceptionally well-lighted and the "washed air" system of ventilation assures healthful working conditions.

President D. A. Burke has surrounded himself with a strong organization, a number of the men being well-known in the automotive field. General Sales Manager J. G. Wilmoth has been with General Motors for several years. At the time he became identified with Sheridan, he was manager for one of the General Motors units at Philadelphia. His sales experience is broad and comprehensive.

W. H. Farr, formerly with General Motors division and experienced in machinist and tool making trades, is manager of production.

Hugh Law is the engineer in charge. Mr. Law's engineering experience has embraced railroad work, also service as head of a leading technical school. He was formerly with the General Motors Corp.

F. J. Martin, purchasing agent, has been with General Motors for five years. His business activity has included the management of credits and collections for one of the largest manufacturing concerns, also a connection with a New York banking house.

F. B. Stuart, supervisor of material, has been with the General Motors units covering a period of eight years. His work has included engineering, tool and machine designing. M. M. Roberts, manager of advertising, was with a General Motors' unit for four years.

The body design engineer, with General Motors continuously for over seven years, is E. W. Northrop. Mr. Northrop has specialized in body work for 12 years.

### Fair-Week Advertising Scheme Calls for Attention.

The accompanying illustration shows the layout used in a clever fair-week atten-

tion-getting scheme of the Case Auto Co., of Rochester, Minn.

For the small sum of \$15, the slight trouble of filling the glass globe with Chevrolet parts and preparing the placard to be used, the company secured 1,100 names and addresses of fair patrons from various parts of the county and adjoining counties, as well as the passing attention of other hundreds who did not desire to enter the guessing contest.

This gave the organization a "live" mailing list of persons, all of whom were presumably interested in cars in some way, either as owners—therefore in need of repairs, accessories, parts, gas and oils—or as prospective owners.

The company also called special attention to the smaller of the two makes of cars they handle—which was wise since a far larger public has the wherewithal to purchase and run a light car than is the case with the heavier and more expensive cars. Incidentally, the Case Auto Co.'s whole fair exhibit received a larger share of attention than would otherwise have been the case.

The best guessers of the value of parts in the globe were to get their winnings not in cash, but in trade at the company's place of business, which necessitated at least one call from each of the 12 winners. Courteous service at that time undoubtedly meant repeated calls from them all.

The list of winners was published in each of the local dailies and also placed on exhibit in the office windows of the company. There were some very close guesses in the list.

### Book Review.

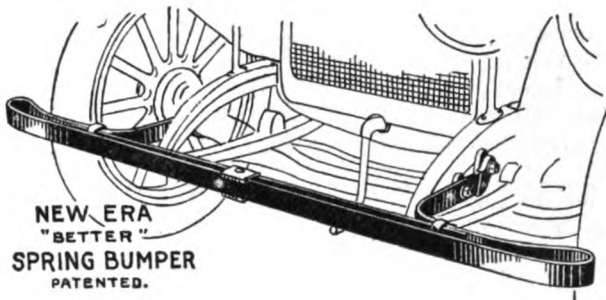
THE AUTOMOBILE STORAGE BATTERY, ITS CARE AND REPAIR, a practical book for the repairman, by O. A. Witte. Published by



The Bowl Filled With Automobile Parts Furnished the Basis of the Guessing Contest.



# NEW ERA



As you know, there is only one reason in the world for using springs in anything—and that is to take care of recoil and soften the impact. Why, then, sell anything but a bumper with the same principle? Why not build your bumper business on a sound sales argument that has no “come back”?

New Era “Better” Spring Bumpers with double spring steel bars tied at both ends and strengthened in the center not only provide the necessary recoil from blows but add double strength, double life because of the two bars. Moreover, the interchangeable arm feature permits you to keep your stock centered on those cars most popular in your locality—no dead stock—and to your customers we present a guarantee that New Eras may be replaced free if for any cause whatsoever they are damaged. Can you build as many real sales talks on any other line?

Your jobber has or can get New Eras—we are equipped to make **immediate** shipments.

*Write for Catalog*

**NEW ERA SPRING  
& SPECIALTY CO.**

56 Cottage Grove Ave.,  
Grand Rapids, Mich.



**“Better”  
Spring BUMPERS**



## This man does most of the valve grinding in his locality

because he does perfect work on every job—no matter how worn or pitted the valves may be. He charges no more than shops using the hand method of grinding, yet he makes a larger net profit on every job with his

## ECLIPSE VALVE GRINDER

This is the tool that set a new standard in valve grinding and rendered hand grinding obsolete.

The Ballistic movement of the ECLIPSE affords the best and easiest process of grinding valves. The slow rotation and the rapid back-and-forth motion are accomplished automatically by the motor operating a specially designed mechanism. As shown in the illustration, one hand suffices to guide the ECLIPSE and seat the valve perfectly.

The ECLIPSE VALVE GRINDER is a light, rugged, portable, electric-drive tool with ample power. It not only does a better job than the hand method, but does it much more quickly and at a fraction of the cost.

*Write today for interesting circular.*

**Eclipse Valve Grinder Co.**

Dept. C., 20th St. at Oak

Kansas City - - - Missouri

the American Bureau of Engineering, Inc., Chicago. Second edition; 402 pages, 5 ins. by 7½ ins.; 198 illustrations. Price \$5.

"The only book of its kind" is the way the Ambu Engineering Institute describes "The Automobile Storage Battery, Its Care and Repair," which, in non-technical language, gives the theory, construction, operation, manufacture, maintenance, and repair of the lead-acid battery used on the automobile. It describes at length all subjects which help the repairman build up a successful battery-repair business. A chapter on farm lighting batteries is included.

The book is amply illustrated with both diagrams and photographs and will be found a most practical and valuable volume for the repairman.

The table of contents gives a general idea of the information which the 17 chapters contain:

Batteries in general; manufacture of

storage batteries; chemical actions which produce electricity; how chemical actions produce electricity; what takes place during discharge; what takes place during charge; capacity of storage batteries; internal resistance; conditions of operations on the car; how to take care of the battery of the car; battery troubles.

The workshop and its equipment; determination of condition of battery; rebuilding the battery; special instructions in regard to specific makes; farm lighting batteries.

It is an excellent book for the garage-man who handles, or expects to handle, battery work.

### Republic Truck Sales Corp. Has Students' Essay Contest.

A university scholarship of \$1,000 was recently offered by the Republic Truck Sales Corp. in a high school students' essay

contest on good roads which was conducted in connection with the recent national "ship by truck—good roads" week.

The scholarship was won by a Massachusetts lad whose essay the judges said revealed an unusually keen perception of economic requirements. Some of the points which the winner brings out are very interesting.

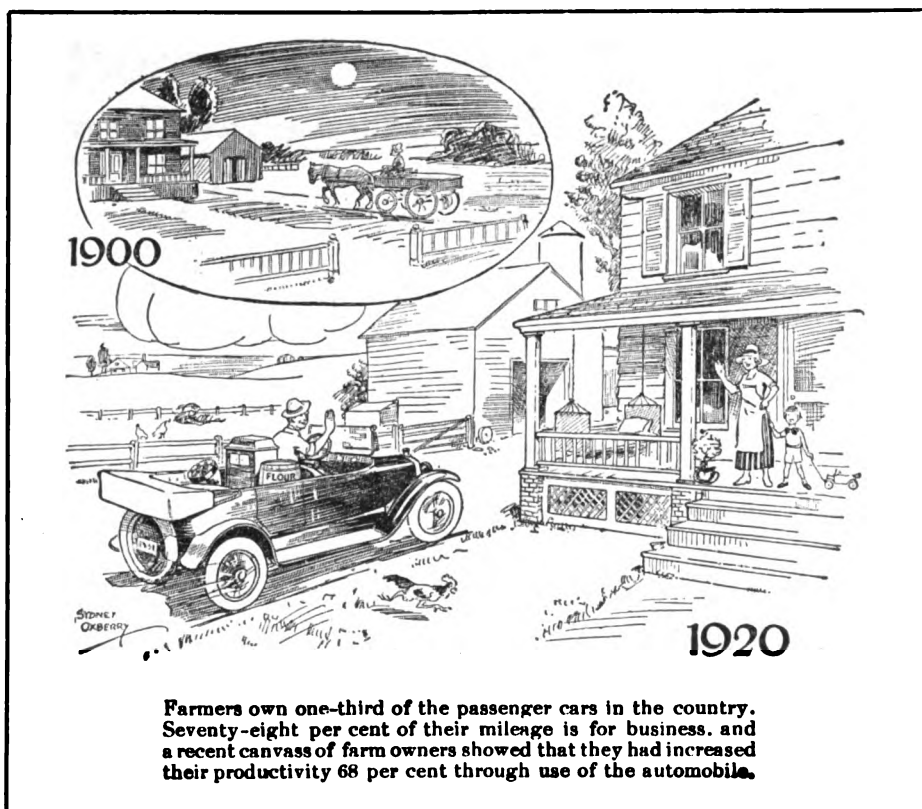
"A valuable and most logical conclusion to that well known statement that railroads serve as the 'long arm of commerce' would be that motor trucks serve as the 'finger' to that long arm, and 'reach out here, there, and everywhere to pick up the load, or place it at its destination.'

"Realizing the great importance and necessity of motor transportation, it must be evident that there should be co-operation with our railway service, rather than competition. Although it is an established fact that there is a field where movement by rail carrier is not economical and where service could be better performed by motor trucks, it can be plainly seen that to compete in the longer hauls with rail carriers under normal conditions would be uneconomic and unwise.

"On long distance hauls motor transportation could not be as rapid and efficient as railway service, because of lack of speed, of capacity, and of endurance, in comparison with our modern railway facilities for long distance hauling and hard usage. But in developing territory not touched by rail, in inter-city movements, and in short hauls, motor transportation excels. So it may be concluded that a system or schedule arranged between motor and railway interests would not only be beneficial to both parties, but would give an increased efficiency to the public.

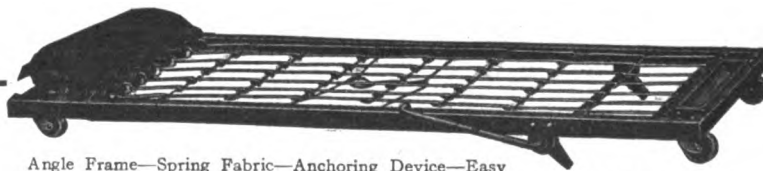
"The adoption of motor transportation, however, is only one-half of the solution—for good roads are vitally necessary to all truck activities on an efficiency basis. Therefore, with the development of our motor truck system, our roads must be improved and extended.

"To get the greatest possible benefit out of this solution of our railway congestion problem, excellent and extensive roads must be built for the motor trucks, for the two movements naturally interlock."



## Foster

Auto Repair Creeper  
METAL CONSTRUCTION



Angle Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

FOSTER BROS. MFG. CO., UTICA, N. Y., U. S. A.

\$5.00

Ask for the name of the Foster distributor in your territory.

#### DIRECT REPRESENTATIVES

Eastern and Southern States: Asch & Co., 16-24 W. 61st St., New York, N. Y. For the Mid-West: Jessop & Thompson, 1421 S. Michigan Ave., Chicago, Ill. Pacific Coast & Intermountain Territory: McDonald & Linforth, 739 Call Bldg., San Francisco, Cal.

# Don't Sell Boomerang Springs



**I**N THE FINAL RECKONING of profits, the sale of "boomerang" springs, or the kind that come back with complaints, is like building your business on sand instead of rock.

To make sure that every spring replacement will breed satisfied patronage, sell the Harvey Guaranteed Spring.

The only "come-back" feature of the Harvey Spring is its resilience, its free and easy action that adds much to the comfort of the car.

The patented Harvey process of heat treating and tempering gives this spring remarkable strength and resilience without the danger of breakage or sagging..

Harvey Springs are made boltless and have no weak spots. They will bear up under the emergencies that break the ordinary spring.

The purchaser of Harvey Springs is protected by the broad Harvey guarantee. For the dealer this same guarantee acts as protection against complaints.

Harvey dealers' sales are made easier by this guarantee and the known quality of the Harvey Spring. Other selling aids are a part of our co-operative service to dealers. Send for the Harvey Book containing specifications for over 1500 kinds of springs, and other useful information.

## HARVEY SPRING & FORGING CO.

104A 17th. St., RACINE, WIS.



## APCO Equipment for FORDS

### Stop that rattling Steering Wheel on Your Ford

The steering column brace eliminates all vibration of the wheel and holds it solid. Other cars use one - Fords Need It.

Sold by dealers everywhere, or prepaid on receipt of price.

Apco Mfg. Co., Providence



### Put Your Ford Horn where you can reach it. It is

attached to the throttle or gas lever where it is under the driver's finger at all times.

**APCO Horn Button**  
consists of button, bracket and wire  
Sold by dealers everywhere, or prepaid on receipt of price  
Apco Mfg. Co., Providence, R. I.

### Does Your Ford Wander off the Road?

#### FRONT AXLE BRACE

Holds axle firmly in position, reinforces front radius rod preventing bending and breaking.

Stabilizes the whole front of your car  
At your dealer or send his name with your order direct to  
Apco Mfg. Co., Providence, R. I.

**\$250**

Also made in Angle Steel - \$1.50

### Hitting on all Four

The testing valve in the new  
**APCO MUFFLER**

tells you at once and finds the skip if there is one. It can't explode, loosen or rattle and is designed to muffle the exhaust without back pressure.

At your dealers or if not sent direct on receipt of price.  
**\$5** COMPLETE  
APCO MFG. CO. PROV. R. I.

**MAKES YOUR  
FORD  
MORE CAR**

### Is Your Ford Full of Rattles?



**STOP** this source of annoyance and danger at once with—  
**APCO Anti-Rattlers**  
Heavy springs automatically take up the wear  
Radius Rod 1 in a box 60c ea.  
Steering Rod 2 in a box 60c pr.  
At your dealers or send his name with your order direct to  
**APCO MFG. CO.**  
Providence.

Send for Our Catalog  
and Price Lists

**APCO MFG. COMPANY**  
Providence, R. I.

### Former Splitdorf Man Joins Jenkins Vulcan Spring Co.

It is announced that T. P. Nickell, for several years service and sales engineer and equipment sales representative of the Splitdorf Electric Co., has recently joined the sales force of the Jenkins Vulcan



Mr. Nickell Has a Wide Acquaintance in Automotive Trade Circles.

Spring Co., Richmond, Ind., as special representative.

Prior to forming his connection with the Vulcan company, Mr. Nickell was New England branch manager for the Splitdorf Co. He is well known among automotive men in the middle West, and has a particularly wide acquaintance in New England trade circles.

### Many Innovations at the Automobile Show in Cincinnati.

Graceful bodies and matchless engines marked the display of limousines, sedans, coupes, roadsters and sports models at the automobile show held in Cincinnati, September 18 to 25.

Exhibits were entered by 37 dealers and 20 dealers in accessories.

Most of the cars entered were of extreme stream line effect. The hood runs back almost on a plane with the radiator cap, the cowl dips slightly to the dash line that rises a bit over the back of the rear seat. Corners are inclined to be square; the rear of the body being almost rectangular on many machines. Several of the "shoulders" are broken by air doors that open upward, lending a mild relief to the severity of straightness.

Crown fenders, so long in vogue, are modified slightly, with the "hump" effect obtained frequently by a new curve to the edges. Fenders appear to be somewhat wider than before and dip closer to the road, thereby assuring greater protection.

Both the front and rear of the car are shielded from below by broad continuations of the fenders beneath the radiator

and across the rear. Many of the inward turns of rear protectors are gone, giving an appearance of flatness.

Tops on many open models show extended rear quarter curtains that embrace almost all of the tonneau seat. Vision is obtained through broad windows which, incidentally, are of a better quality of mica than once was accepted.

The tops almost without exception are of leather variety material.

Several cars have adopted the new starting device that does away with the pedal and is operated by a key on the dash.

On the show cars, cord tires are preponderant. Dealers of smaller-price cars, however, use fabric tires for standard equipment.

Steering wheels are comfortably large and set a bit higher than before. Spark and gas levers are being placed more frequently on the top of the wheel as is the horn button.

Demonstrations were given to show how the farmer may utilize his car as a power plant for his house and barn machinery. The real wheels were jacked off the floor and the driving apparatus connected with various farm machinery. It was shown how electricity may be generated for lights, irons, washing machines and similar uses. Then the car may be connected to run corn shellers, feed grinders, churns, separators and water pumps.

Such demonstrations included all makes of cars from Fords to the expensive multi-cylinder cars.

### European Patents Issued on Myers Magazine Oiling System.

France, Belgium and Italy have issued patents to Cornelius T. Myers, consulting engineer, Rahway, N. J., covering the Myers magazine oiling system of chassis lubrication.

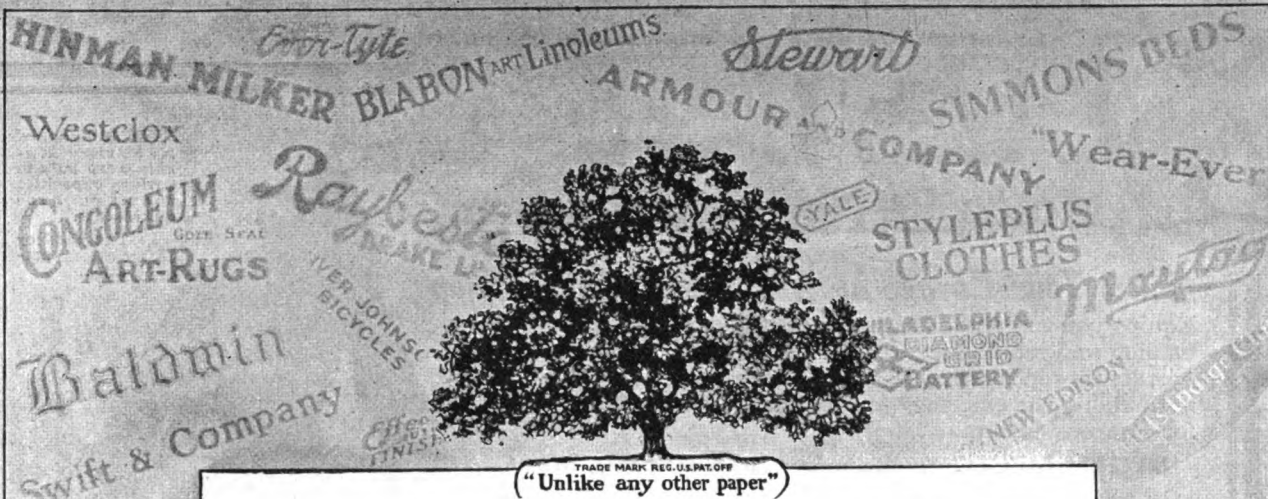
This system is used on the Liberty Class "B", Fageol, Diamond T, Ward LaFrance, Service, Bethlehem and several other trucks in the United States which have taken out licenses through the Chassis Lubricating Co., of 47 W. 34th St., New York.

The European licensing arrangements will be handled by Hart O. Berg, 32 Avenue des Champs Elysees, Paris, who is very well known in the automotive industry, both abroad and in this country. He represented Wilbur and Orville Wright in the sale of their foreign patent rights on airplanes, and introduced the Browning piston abroad. He also represented the Lake Submarine Torpedo Co. abroad, and has handled a number of foreign patents in this country.

### Dates for Chicago and New York Shows Are Announced.

The Chicago Automobile show will be held in the Coliseum and First Regiment Armory from January 29 to February 5. The New York exposition will be held at Grand Central Palace, January 8 to 15.





Check up with the rural route carriers in your town on the day when The Farm Journal comes in. You'll find hundreds—and it may be thousands—of its readers within buying radius of your store.

They exert a constant buying pull on the standard, advertised merchandise which you carry. The Farm Journal is their farming guide, household guide, buying guide.

*Advertising can't bring customers to your store unless they see it and read it. That's why it will be well worth your while to compare general magazine and farm paper circulation in your vicinity. Get chummy with your Postmaster—he'll help you out.*

# The Farm Journal

CHICAGO PHILADELPHIA NEW-YORK

*Sells Most Goods Because  
Read by Most Farmers*

# STORM

## Motor Re-Newing Equipment

### Makes Your Garage an All 'Round Repair Shop

Equips you to handle the most profitable class of work—overhauling and rebuilding. Storm Tools are practical and can be operated by inexperienced men. They soon pay for their cost in doubling the efficiency and output of your shop. Write us for complete information.

**STORM MFG. CO.** Dept. E Minneapolis, Minn.

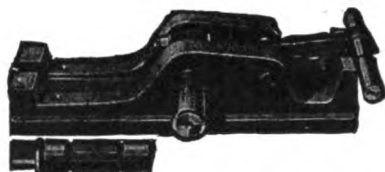
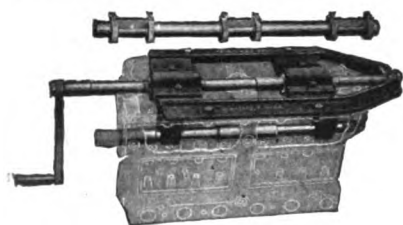
*STORM Standard Re-boring Machines* are built in various capacities to suit your requirements.

For hand or power operation.

Get These Bigger Profits



**STORM Main Bearing Babbitting and Boring Tool** makes a new, perfect bearing exactly the same as the original and in the exact original position. Two sizes—Ford and Fordson Motor.



**STORM Connecting Rod Bearing Reamer, Jig and Straightening Gauge** accurately and quickly fits and cleans connecting rod bearings. Solves labor problem—no experience necessary to operate.



### Automotive Wiring Manual

is what you need to render quicker and more accurate electrical service and make more money. There is nothing to equal it on the market at any price that gives you the authentic, down-to-date electrical information on any and all cars and trucks as contained in the new 1920 edition. Contains blueprints on all cars and trucks from 1912 to date.

Over 800 blueprints; over 600 models of cars; 200 internals. Full size of blueprints, 7 1/4" x 11", large enough to be easily read; no need for magnifying glass to make out details. Bound in one volume, thus always complete, an advantage you cannot secure elsewhere.

### QUIT GUESSING—KNOW

Your reputation as an Electrical Expert will not be made through an occasional lucky guess. You should know every time just what you are doing. The best assurance that you will is through the purchase of the Automotive Wiring Manual—1920 Edition. Price \$15.00 delivered.

### Automotive Publishing Co.

448 South Dearborn St. : : : : Chicago  
910 So. Grand Ave., Los Angeles 41 E. 29th St., New York

## Why Don't You Use WIGGINS Peerless Book-Form CARDS

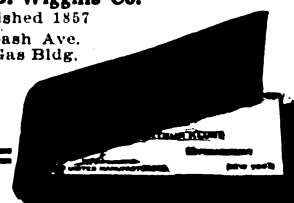
Saves the firm about 40% on card cost because there are no wasted or soiled cards. Salesmen prefer them because they save a lot of time and bother and they use the tissue between each card for memoranda. Handy leather case fits vest pocket and cards detach with a smooth, clean edge not perforated.

Let us send you tab of specimens, see for yourself the unusual quality and careful workmanship which distinguish WIGGINS CARDS.

### The John B. Wiggins Co.

Established 1857

1104 So. Wabash Ave.  
705 Peoples Gas Bldg.  
Chicago



# THE ROMORT AIR & WATER STATION

## Twice the service in half the time

### There's One Thing Certain

The more service you provide for the convenience of the motorist, the more friends you will make, the more business you will get and the bigger your profits will be—that's why

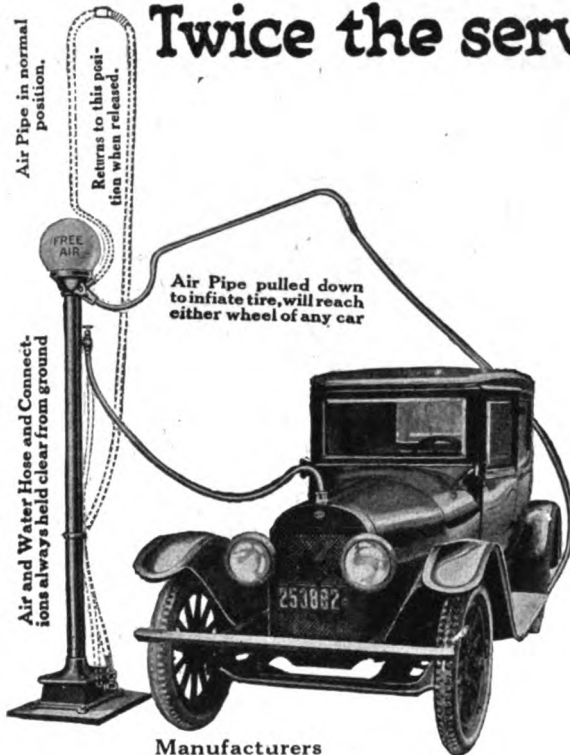
The Romort Air and Water Station is a gilt-edged investment.

Its service is unparalleled.

Motorists go out of their way to use the Romort Air and Water Station, for they know the air hose will be free from dirt and oil, and water service will be available without trouble and loss of time.

It widens the path to profits.

A postal will bring full details.



Manufacturers  
**THE ROMORT MFG. CO.**  
Oakfield, Wis.

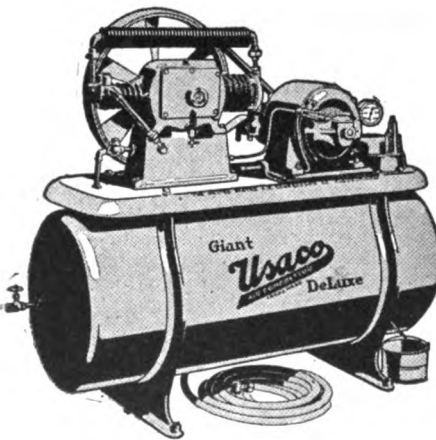
*A Monument to Service*

Sales Dept.  
**THE ZINKE CO.**  
1323 Michigan Ave., Chicago, Ill.

*"Quality Remains Long After the Price Is Forgotten"*

The Usaco Giant De Luxe, capacity 7 cu. ft. per minute. Has 60 gallon tank tested to 500 pounds and suitable for working pressure of 250 pounds. Of the same general design as the Standard, but with greater capacity, having a more powerful motor and tank with double capacity.

Particularly adapted for the gruelling service encountered in inflating giant truck tires, a service which it handles with gratifying speed and ability. Also furnished in portable form.



The Usaco Standard De Luxe, capacity 4 cu. ft. per minute. Has 30 gallon tank tested to 400 pounds and suitable for a working pressure of 200 pounds. A completely automatic unit of the highest quality. Furnishes high pressure air in great volume for tires of all sizes and pressures and is quiet running and practically foolproof.

Also furnished with 60 gallon tank or with wheels to provide portability.

## Two Names That Assure Dependable Quality— STERLING *Usaco* AIR COMPRESSORS

**J**UST as the word STERLING on silverware is accepted as the mark of dependability, the name Usaco is being universally established as an assurance of highest quality and all 'round serviceability in an air compressor.

The evolution of this reputation dates back to the day when the Usaco Two Stage Air Compressor was considered years in advance of the times, because of its superior state of development. But, changing conditions, entailing an increase in the volume and severity of air compressor demands, brought the Usaco Two Stage Compressor into its deserving position. In much the same manner as tungsten lamps have completely replaced carbon bulbs, the Usaco Two Stage Air Compressor is "leavening the whole lump" of Air compressor opinion.

Usaco Quality is inbuilt—tangible—the result of knowledge of what to do and what not to do gained through years of experience. In every detail it involves refinements and mechanical improvements that place it on an incomparable high plane of efficiency. Insist upon the genuine Usaco Two Stage Compressor. If your jobber cannot supply it let us send the name of one who can. In any event get the Usaco literature and be conversant regarding the latest developments in air compressor design.

**The United States Air Compressor Co.**  
5308 Harvard Ave. Cleveland, Ohio

Please send literature advertised in American Garage and Auto Dealer to name written on margin. My jobber is.....

## The WASHBURN Torch



## A Real Measure of \$25<sup>00</sup> Worth

The real measure of value is *not* how much you pay for a thing, but how much it will pay you.

We have nothing to conceal in the price of the Washburn Torch. It is \$25.00, from your jobber or from us. This price is arrived at in exactly the same manner that you arrive at *your* prices—cost plus a fair profit.

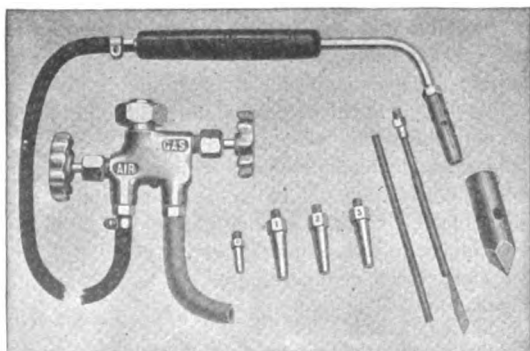
Consider the Washburn Torch as an investment. As previous advertisements have informed you, the Washburn is a gas-and-air-burning torch developing 5300 degrees of heat from Prest-o-lite gas and compressed air (2 lbs. pressure or over). A range of 4000 degrees of this intense heat may be controlled instantly to just the heat you require. The flame is always *needle pointed* and never pops out. The extra tips furnished make the Washburn an Oxy-Acetylene torch when you so desire.

Here you have in *one* torch all that can be found in *any* torch—and then some! A soldering tip, and combination torch-and-soldering tip does away with your soldering iron and blow torch.

With the Washburn Torch in your possession you are instantly ready for every job that comes into your shop requiring soldering, light welding, lead burning, brazing or oxy-acetylene work. You assign highly paid men to work of this kind. When you put into their hands a tool that enhances their skill, saves their time, applies to any job and does a *better* job, you are not long in earning the price of that tool. One demonstration is enough to prove that *the Washburn Torch is your money's worth*.

The outfit includes Complete Washburn Torch, Mixer (gas and air regulator) two hose lengths, hose connections, four varied oxy-acetylene tips, and combination torch-and-soldering tip. Get it from your jobber, or from us direct if he can't supply you. Complete information for the asking.

**WASHBURN BURNER CORPORATION**  
303 DESPATCH BLDG. KOKOMO, INDIANA



## No more broken springs Better tire service More gasoline mileage



Patented March 23, 1920

relieve the strain that break springs and wear out tires. Can be adjusted to fit any car. Made for both front and rear springs. DEALERS—Get data and trade prices.

**CHANNON-HUGHSON CO.,** 229-233 W. Erie St. Chicago, Ill.



## RADIATORS for all Cars and Trucks

**OUR SPECIALTY:** Installing *new honey-comb cores* in old or damaged radiators, and returning them within two days after receipt by us or furnishing new cores only, to be installed by radiator repair men throughout the country. We furnish new radiators complete at less than manufacturers' prices.

Dealers and garage and repair shop owners—Patronize our extensive Radiator Department. IT WILL PAY YOU.

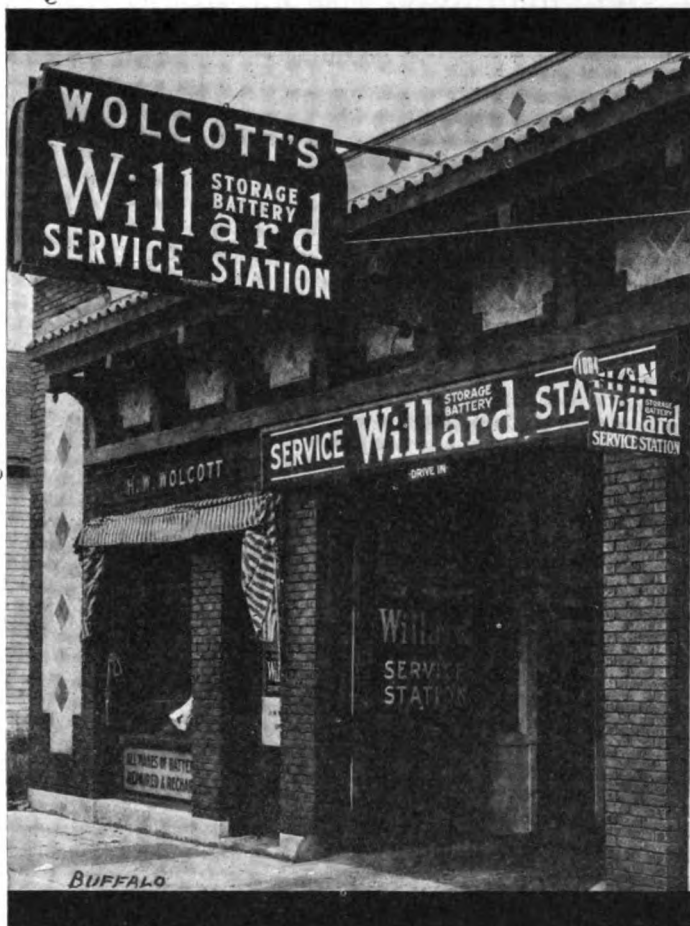
Prices and samples of Core on Request

**INTERNATIONAL RADIATOR CO.**

DEPT. B

1507 Michigan Ave., Chicago, Illinois





## This Oplex Sign Links a Well Known Name to a Location

THIS picture illustrates how an Oplex Electric Sign can link a well-known name to a particular location. Everyone knows "Willard" because of their extensive advertising. The Oplex Sign, perfectly reproducing the trade name design which advertising has made so well known, shows people where the service advertised can be had.

Oplex Electric Signs have raised, snow-white glass letters on a dark background. At night each character stands out a solid letter of light, no broken outlines. Oplex Signs have greatest reading distance, lowest upkeep cost, most distinctive designs, and the added advantage that any trademark can be perfectly reproduced in raised Oplex characters.

Let us send you a sketch showing how your Oplex Sign will look.

**The Flexlume Sign Co.** ELECTRICAL ADVERTISING  
Niagara & Potomac Ave., Buffalo  
Pacific Coast Distributors Canadian Factory  
Electrical Products Corp. The Flexlume Sign Co., Ltd.  
Los Angeles, Cal. Toronto, Ont.

## VICTORY OIL STOVE



**The Best Garage and Shop Heater Made**

**Reduce Heating Costs One-Half**

Operates for one-half less than coal. Is safer, cleaner, quicker and better in every way. Has no superior for heating garage, offices, supply rooms, etc. Patented wickless metal burner lights with a match. Gives instantaneous heat. No waiting. Burns plentiful kerosene. Heats large spaces easily. Absolutely odorless. **SAFE. Guaranteed.** No coal to carry or ashes to dump—no smoke—no flying sparks. Always under perfect control.

**INVESTIGATE** Write for book "The Sensible Heat for You." Gives low factory prices, description and proofs of superiority. Sent **FREE.**

**Victory Oil Stove Co.**  
180 W. Austin Ave. Chicago, Ill.

### PROOF

Chicago, Ill.  
"We have been using successfully and with satisfaction in our store one of your stoves. We find the stove odorless, easy to control and inexpensive of operation."

Very truly yours,  
L. D. Wells Motor Co.  
L. D. Wells, President

## FINCK'S

DETROIT SPECIAL

**OVERALLS & COMBINATION SUITS**

**Let Your Dealer Fit You to Finck's**

**WEAR LIKE A PIG'S NOSE**



**ASK YOUR DEALER**

*Finck's are tough on the rough jobs—Comfortable in any position—the most convenient of any garment you ever wore.*

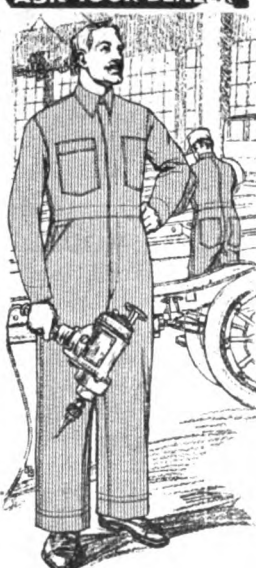
Garage and auto workers prefer Finck's Combinations for a score of good reasons. They find them the most convenient to work in. There is no binding, no straining anywhere. They fit even after many washings. They are cool—no tight waistbands—yet they fit snugly and afford perfect protection to the clothes worn under them. Many pockets, reinforced and conveniently placed. Stay-on buttons are little details that please. And they wear longest because the material and construction are the best we can put into them.

*Ask your dealer for Finck's or write to us.*

**W. M. FINCK & COMPANY**  
Detroit, Michigan

Manufacturers of High Grade Overalls, Men's and Women's Combination Work Suits

Branches:  
St. Louis, Mo.; Dallas, Tex.; Seattle Wash.;  
Chattanooga, Tenn.; Livingston, Mont. (48)



## Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

**Over 350,000 sets now in use**

Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

**Price \$12.00 per set of four.**

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

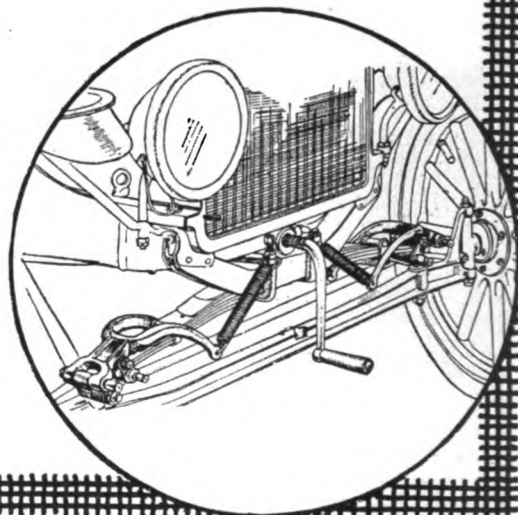
**P. H. Webber Company**

HOOPESTON, ILL.

Chicago Sales Office:

WALTER ECKHOUSE & CO., 616 S. Michigan Ave.

In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.  
London, Ont., Canada



## You get a good share of the profit.

The **MODEL "N" MARVEL CARBURETER** improves car performance, and increases mileage from 22 to 25 miles per gallon.

No changes are necessary to install it. Fits right in place of regular installation.

## MARVEL CARBURETER

*Designed especially for FORDS*

sold on 30 days' trial, with money back if not satisfactory.

**Price F. O. B. Factory \$10.00**

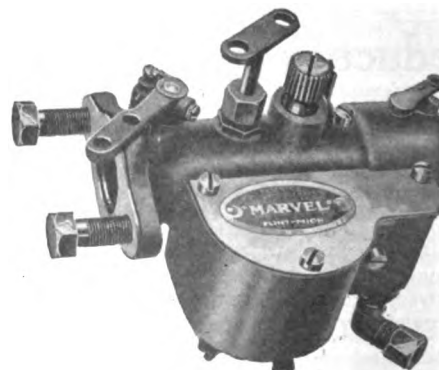
**MODEL "E" CARBURETERS** are standard on Buick, Oakland, Nash, Scripps Booth, GMC, Wilson and all 3/4-ton U. S. A. Government Trucks.

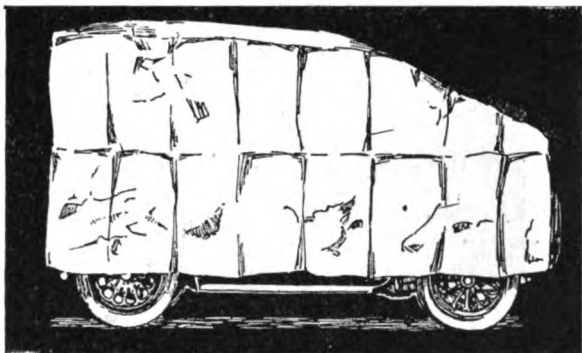
**MODEL "E" Carbureters** greatly improve Maxwell, Overland, and Studebaker cars.

*DEALERS--If interested, write for further information*

**MARVEL CARBURETER COMPANY**

**FLINT, MICHIGAN, U. S. A.**





**Increase the profit of this winter's storage business with**

## **KENNEDY Auto Covers**

the most effective and economical means of protecting cars in storage from dust, dirt, rust, and cold. Car owners readily appreciate the value of Kennedy Covers and you make a good profit on each one used. They are a drawing card for your storage business, and are also quick sellers to car owners who keep their cars in their own garages. Made of strong heavy paper, properly reinforced, and correctly designed in standard sizes to fit any car.

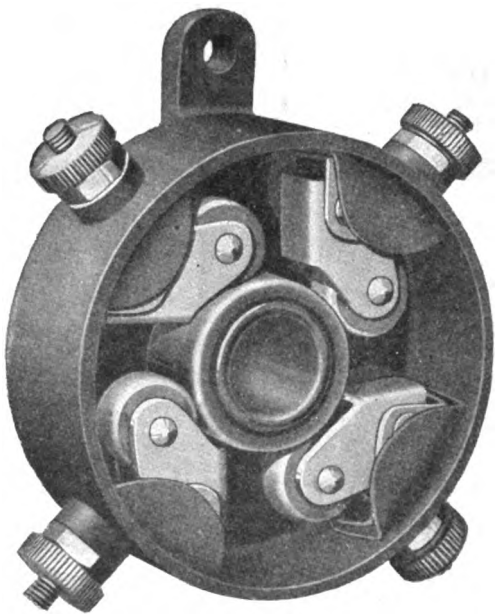
Fill up your storage space this winter and get the repair and equipment business that goes with it.

Write today for prices and details.

**The Kennedy Car Liner and Bag Co.**  
Shelbyville Indiana

Canadian Factory at Woodstock, Ont.

**FOR COLD WEATHER STARTING**



## **DUNTLEY 4 UNIT TIMER**

**For Ford Cars For Fordson Tractors**

Cold weather starting requires a hot spark, unattainable with faulty contacts, or timer mechanism, that is clogged with oil thickened by the cold, but absolutely assured by the positive self-cleaning oil proof contacts of the Duntley. It never misses.

DEALERS: OUR PROPOSITION IS INTERESTING

**J. W. DUNTLEY**

1004 MICHIGAN AVE.

CHICAGO, ILLINOIS

## **Your Reputation**

Every time you equip a customer's car with a dependable Weston Ammeter you enhance your reputation for efficient service and make a good profit as well.



**Weston**  
Model 354  
Ammeter

gives the Motorist the one reliable means of knowing that his battery is charging regularly and at the proper rate.

This is the Instrument with which the public is familiar through our National advertising campaign. The Motorist knows that he can count on the Weston—that it is always on guard over his battery.

Standard equipment on most of the higher-grade Domestic and Foreign cars, this Instrument has built for itself a World-wide reputation for accuracy, dependability and efficient service under the most trying conditions of hard use. Write us.

**Weston Electrical Instrument Co.**  
30 Weston Ave., Newark, N. J.  
Branches in All the Principal Cities.

## **BUTTERFIELD Combination Automobile Screw Plates**



The oldest, and without exception, the most popular set on the market.

Contains all in one set, both U. S. Standard and S. A. E. Standard taps and dies.

Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

Ask for Catalogue No. 18.

**BUTTERFIELD & CO. DIV.**

Union Twist Drill Co.

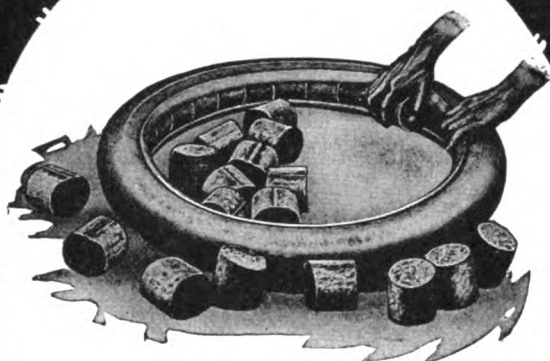
Derby Line

Vermont

U. S. A.



# The TIRE FILLER that has made good



## Trouble-proof tires with ample resiliency

is a combination that was long sought by the motoring public. Some tire fillers failed to stand up under long service—most of them lacked the essential resiliency. But these two vital qualities were at last combined in

## NATIONAL RUBBER TIRE FILLER

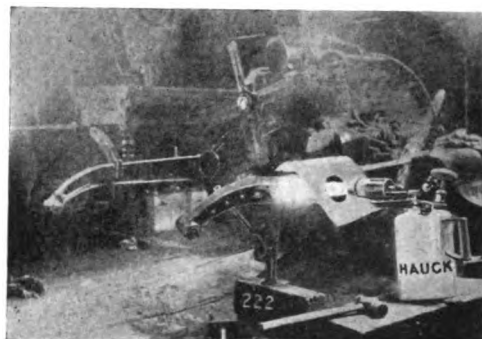
It has brought joy and satisfaction to tens of thousands of car and truck owners. It has done away with punctures, vulcanizing, patching, tire repairs of all kinds. Users get 10,000 to 20,000 miles out of every tire.

Besides, National Tire Filler has a wonderful resiliency. It takes the place of air, rides as easy, and does away with the inner tube.

National Rubber Filler is made of the best grade of rubber, cut in small particles, treated, moulded and vulcanized by our special process. The result is a compound that is light, strong and resilient. Made in sizes to fit all standard tires. It is laid in the tire and not melted or poured in. Will not harden, freeze, or melt—fully guaranteed against deterioration in any form.

DEALERS—National Rubber Tire Filler sells because it has made good. It combines comfort with economy of tire upkeep. We have a fine proposition for you. Write us today.

**National Rubber Filler Co.**  
210 College St. Midlothian, Tex.



## Twisted Chassis Straightened in 6 Minutes with a Hauck No. 14 Kerosene Torch

A piece of sheet iron bent in the manner shown in the illustration was used to confine the heat to the part to be straightened, which became cherry red in less than 5 minutes.

The powerful, blue-red flame of the burner is clean, without smoke or soot. The burner is made of special heat resisting metal, without coils. All the oil passages are straight and can easily be cleaned. The oil valve has a ball check to prevent the hot oils from the burner returning to the tank.

A new feature of the Nos. 14 and 15 sizes, is the priming pan valve.

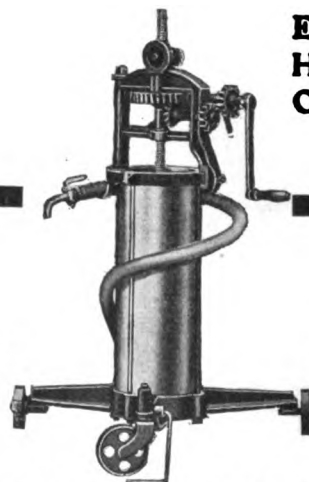
Besides straightening, the Hauck Torches are used for expanding, brazing, soldering, preheating and melting babbit out of bearings.

Write for prices and copy of Bulletin No. 104  
"Quick Auto Repairs"

**HAUCK MANUFACTURING COMPANY**  
126-134 Tenth Street, Brooklyn, N. Y.

**POURS  
OUT  
STEADY  
PROFITS**

**ENTIRELY  
HAND  
OPERATED**



Model K holds  
20 lbs. grease  
or 2½ gals. oil.

Model N holds  
56 lbs. grease  
or 7 gals. oil.

## Ekern "Model N" Portable Garage Grease Gun

Undoubtedly there is scarcely any garage equipment which is absolutely indispensable; yet there are a few products which come mighty close to being necessary. Among these, our "MODEL K" and "MODEL N" PORTABLE GARAGE GREASE GUNS are very prominent.

Address us today for full particulars.

*H. G. Paro Co.*

**1412-14 South Michigan Blvd.  
CHICAGO, ILL.**



CLARK'S  
UNITYPE  
TRADE MARK

## Speed up the Turnover on Those Used Cars

SAVE  
\$100 TO \$200 ON  
THESE FINE CARS

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|----------|------------|--------|
| FRANKLIN | LIMOUSINE  | \$595  |
| OVERLAND | 6 CYLINDER | \$645  |
| CADILLAC | LANDAULET  | \$1975 |
| MERCER   | TOURING    | \$995  |
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ALL IN GOOD CONDITION

MODEL H520

You can't expect the buyer to know what used cars *YOU* have to sell unless *YOU* tell him.

## UNITYPE SIGNS

not only do this, but they modernize the appearance of your show room.

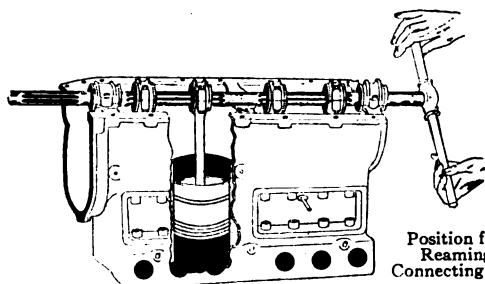
A changeable sign—strong white on black (quick changing) that graces the magnificent show rooms of the Metropolitan Auto Rows will brighten up and put life into *YOUR* place too.

UNITYPE SIGNS sell your used cars for you—they bring you new customers from off the street.

UNITYPE SIGNS are all metal and come in many sizes and styles at prices within reach of all.

Catalog on request

**W. L. CLARK COMPANY, Inc.**  
115 Nassau Street New York, N. Y.

Position for  
Reaming  
Connecting Rods

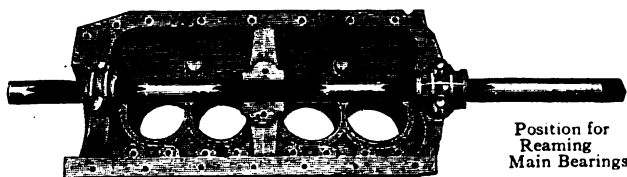
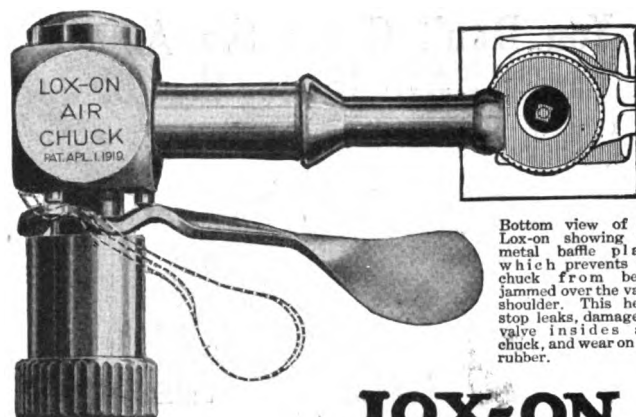
## The LEWIS REAMER Multiplies Profits

In more ways than one. It takes only an hour and a half to ream the seven bearings in a Ford motor as against eight hours by the hand method. Your labor cost is further reduced by the fact that you do not need a high priced mechanic to operate your Lewis Reamer. Any man in your shop can do satisfactory work on either connecting rods or main bearings.

Your customers will be highly pleased with the perfect work turned out by your Lewis Reamer. The first three jobs pay for it.

Ask your jobber or write us today for particulars.

**LEWIS TOOL COMPANY**  
612 Fifth Ave., South Minneapolis, Minn.

Position for  
Reaming  
Main Bearings

Bottom view of the Lox-on showing the metal baffle plate which prevents the chuck from being jammed over the valve shoulder. This helps stop leaks, damage to valve insides and chuck, and wear on the rubber.

**LOX-ON**  
AIR CHUCK  
DON'T RUB THE RUBBER

**YOU** can stop that air and tire inflating trouble right now. Get the Lox-on Air Chuck. It is a new chuck, made in a thoughtful way.

Instead of having one of the old rubber washers that gets worn out by *pushing* over the valve threads and *pulling off*—the Lox-on slips on easily, then a flip of the lever makes a rubber cylinder clutch the valve tightly—another flip loosens it.

The Lox-on can't leak. It will last indefinitely. It is easy and simple to work—lasts longer and gives better service than ordinary chucks. It cuts down electric bills, and wear and tear on pumps.

It will be a real pleasure for you to see how the Lox-on can raise the efficiency of your air hose connections. Fits either 1/4 in. or 3/8 in. hose. Order one today—try it out. \$3.00 each. Dealers—write us or ask your jobber.



## Whistler

TRADE MARK  
"IT WHISTLES WHEN IT'S HAD ENOUGH"

The Whistler Pressure Regulator saves 50% to 75% on tires, 20% gasoline and a lot of time, trouble and inconvenience. Simply screw it on your old valve. Set it for the correct pressure. Start the air in, and when the pressure gets right, the Whistler automatically closes and announces "enough" with a cheery whistle. It's a bang-up steady seller. \$4.00 per set of 4.

The Whistler is used as regular equipment on Dural Antimony Hand Made Tubes.

**Automatic Safety Tire Valve Corp.**

1753-55 Broadway, New York

Factory: Long Island City, New York

## You Don't Guess the Answer You READ It on the Blade

Cylinder measurements guaranteed accurate to within .00025" and less.



## The AM-PE-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

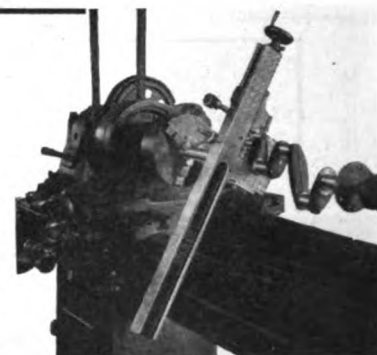
Get the whole story in our Circular

PRICE \$2.50

**AM-PE-CO SALES CO.**  
MARSHALLTOWN, IOWA

## No Filing No Offsetting No Jigs

The Weber Tool turns ALL Pins from ONE setting of the Crank Shaft, ON CENTERS. It is the only Tool of its kind that will leave a pin absolutely parallel to the main bearings. The cutter used is a Forming Tool, cutting entire width of pin at once. A micrometer dial enables operator to gauge his cuts and turn all pins to a uniform size.



Perfected and Proven

A micrometer dial enables operator to gauge his cuts and turn all pins to a uniform size.

## Weber Crank-Pin Re-Turning Tool

How many times have you assembled a gas engine, knowing full well that the crank shaft needed trueing up? You did not want to send it out and delay your customer. You knew, too, that it would cost considerable to have it done.

With the Weber Tool *you can do* this work whenever necessary. NO DELAY—NO EXPENSE.

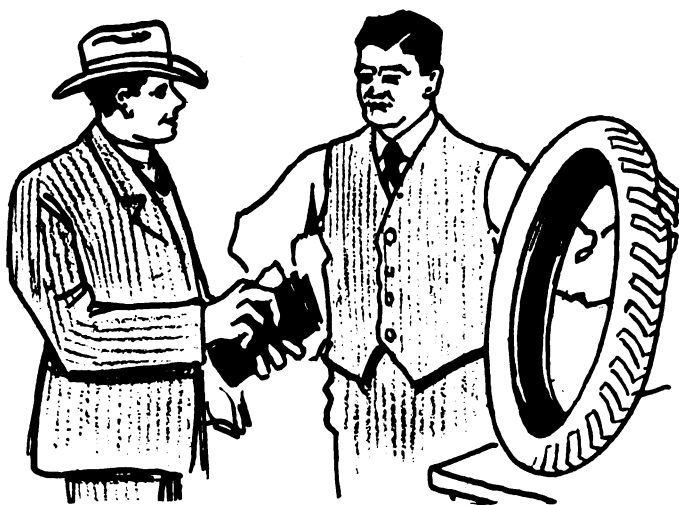
Why not do this work *in your shop* and have more satisfied customers and put *more profits* in your own pocket?



The Weber Tool is guaranteed to turn crank-pins within as close limits of accuracy as any other known method.

Picture at top shows Weber Tool in operation on 4-throw Crank Shaft. All four pins are turned and finished from this one setting. Write for Circular and prices or ask your jobber.

**Sawyer-Weber Tool Mfg. Co.**  
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By giving them 5000 or more additional miles at a moderate cost. No matter if your tires are punctured, sand-blistered, rim-cut, or blown-out—send them to us. We remake them by a process that gives them more mileage than many of the new tires sold nowadays.

DEALERS—We have an interesting proposition for you. Write today for full particulars.

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## Air! the life of the tire depends on it

Do not be afraid to press the purchase of a  
**SCHRADER UNIVERSAL  
TIRE PRESSURE GAUGE**  
on a customer.

He will thank you for it after he discovers the saving in both tires and gasoline that it makes possible.

Price \$1.50

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in your community. Enjoy the reputation for turning out high grade dependable work, and the profits that go with it.

We help repairmen and mechanics to lessen their troubles, eliminate guesswork and experiments, thus producing better and more profitable work.

PHILLIPS TESTING INSTRUMENTS will enable you to locate electrical troubles quickly and accurately.

OUR 500 PAGE INFORMATION BOOK is full of simple instructions on the subjects it covers, together with wiring and circuit diagrams. Price \$2.50.

Write for our complete catalog.

**H. E. PHILLIPS & CO.**  
UNION CITY, IND.



Model 502 Test Set  
Price \$25.00 prepaid to you

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Waiting for lower prices before ordering that equipment you need or stocking these accessories your customers want is like sitting on a fence and waiting for your rich uncle to die. You lose more than you can possibly gain by a drop in prices.

To make 1920 your best year buy your requirements NOW.

**AMERICAN GARAGE  
& AUTO DEALER**

## GANSCHOW GEARS

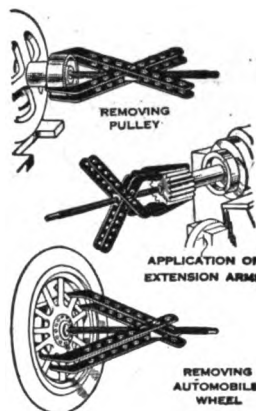
for service and reliability

The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

Write today and feel free to consult our Engineering Department.

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1002 Washington Boulevard  
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## "LITTLE GIANT" GEAR AND WHEEL PULLER

Pulls any gear, wheel or pulley anywhere in a jiffy. Built on the only correct principle. Produces maximum efficiency with minimum effort. Can't twist off or let go. **THE HARDER THE PULL—THE TIGHTER THE GRIP.** Reduces operating cost and increases the earning capacity of any Repair Shop. Made from best grade drop forge steel. Almost unbreakable. Adjustable up to 13 inches diameter. Satisfaction guaranteed or money refunded. Order or write for details today. Price complete with extension arms, \$12.00.

*Liberal Discounts to Dealers.*

**Premier Motor Products Co.**  
3954 North Robey Street Chicago, U. S. A.

## Pondelick Brothers

will pay **\$100**

if they fail to duplicate any part of any make of automobile or truck foreign or domestic, submitted to them. That sum will be paid to the person sending the order.

Parts of any machine can be duplicated in 1 to 3 days' notice. All welding is done at their risk. Do not compare this work or welding with that of others. If you have a broken part or parts that others cannot weld or repair, send them to Pondelick's. They increase the durability of many parts—even where the manufacturers fail.



Supply your customers with "Pondelick's" anti-leak piston rings, and you insure them against engine trouble.

They have the largest and best equipped plants in the United States for the repair or reproduction of automobile parts.

Cylinder regrinding, new piston, special casting, heat treated, Pondelick's self-adjusting, anti-leak piston rings, new wrist pin, hardened and ground, bushing made of genuine bronze, including fitting and assembling of connecting rod to piston for \$15.00.

Reputation, not competition, determines our policies. Visit our plants and be convinced. Ask anywhere or anybody about our work.

General Factory, 5100 to 5112 West 16th St.  
Main Office, Leavitt St. and Jackson Blvd.

**Pondelick Brothers,** CHICAGO ILLINOIS



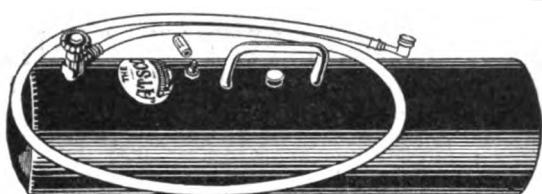
## Buckeye Cleanser

*The Auto Soap that Cleans and Polishes*

The standard cleanser for autos and other painted or highly polished surfaces. Cleans quickly, preserves the finish, restores the lustre.

Made of pure vegetable oils—no grit, no acid, no alkali. Most jobbers have it. Money maker for dealers.

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DAYTON, OHIO



## You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

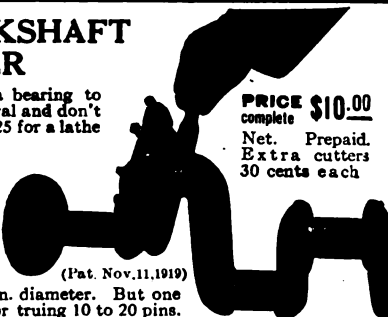
**Air-Tight Steel Tank Company** Pittsburgh, Pa.

## ATLAS CRANKSHAFT GRINDER

Don't attempt to scrape a bearing to crank pin that has worn oval and don't pay a machine shop \$15 or \$25 for a lathe job. Use an

### Atlas Grinding Tool

It will true up a crankshaft to less than one-thousandth of an inch in less than one hour without removing shaft from crank case. Adjustable to all crank pins from 1 1/4 to 2 1/2 in. diameter. But one tool needed, cutters good for truing 10 to 20 pins. 5,000 in use. Send for circular describing



**PRICE \$10.00**  
complete  
Net. Prepaid.  
Extra cutters  
30 cents each

### ATLAS GARAGE UNIT

A machine for testing and straightening crankshafts, and gear press with housing assembly and piston vice attachments

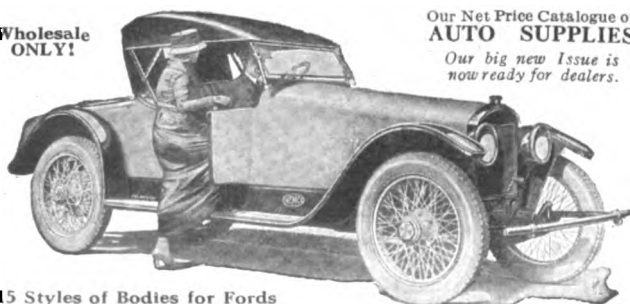
### ATLAS MANUFACTURING COMPANY

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## Send for "The Little Salesman"

Wholesale  
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15 Styles of Bodies for Fords

Make Money Equipping old FORDS with these classy "Fidelity Bodies" listed in "THE LITTLE SALESMAN" \$50 AND UP  
**NEW ENGLAND MILLS CO., 1027 W. VanBuren St., Chicago**

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AUTO SUPPLIES

Our big new Issue is  
now ready for dealers.

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The only way to get proper returns from your repair work is to know the actual time consumed on each job.

**Henry Kastens Time Stamps** furnish an accurate record of just how long each job takes—the correct basis for repair charges.

It stops the mistakes, losses and complaints due to inaccurate charges. Also useful for timing the arrival and departure of rented cars, taxis, etc.



Made in several models to meet every requirement.

Write for booklet and prices.

**HENRY KASTENS**  
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## Lourie Improved Screw Arbor Press

EVERY AUTOMOBILE REPAIR SHOP NEEDS THIS PRESS

Made in Two Sizes

32 in. between posts - \$75.00

42 in. " " - 80.00

We also manufacture a complete line of Hydraulic Presses for every purpose requiring pressure.

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**LOURIE MFG. CO.**  
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## Car owners prefer Graham Socket Wrenches

because they make repairs and adjustments easy, prevent broken parts and save time and temper. They are turned from solid bar stock and are heat treated. For strength and reliability they are unexcelled.

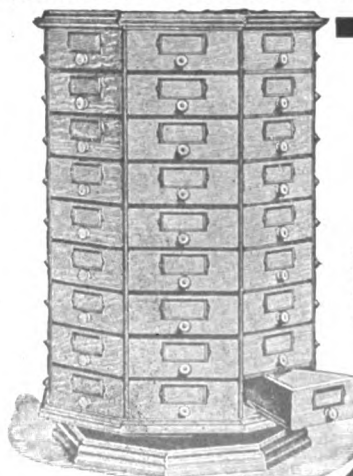
With a No. 2 Set in his car the driver is ready for any emergency.

DEALERS: Write for trade prices

## GRAHAM ROLLER BEARING CO.

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Price \$1.75



## Keep your supplies in revolving cabinets like these

Systematic! Conveniently Accessible! Just like "rolling off a log" to look up bolts, screws, etc., with this revolving cabinet. Everything at your finger tips, with nothing to burden your memory. Used by leading garages of this country.

Buy today from your jobber. Catalogue on request.

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Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



## A TORIT WELDING OUTFIT

IS A NECESSARY PART OF GARAGE EQUIPMENT.

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EXPERT WELDERS. ALUMINUM AND ALL METALS.

SCORED CYLINDERS HANDLED BY THE LAWRENCE PATENT PROCESS.

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SOLD ON AN UNLIMITED MILEAGE GUARANTEE BASIS

*"It's not the name that makes the Tire famous—  
Brunswick Tires help keep the name famous."*

The Brunswick is a composite of every sound principle of tire-making. Just as a well-built chain is composed of links of equal strength, so in Brunswick Tires no essential feature has been over-emphasized at the expense of any other. The Brunswick is the final and ultimate type of tire.

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General Offices: 623-633 So. Wabash Ave., Chicago  
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It will introduce to you a complete line of automobile repair equipment, tested and used by leading Service Stations and backed by the "Fairbanks O. K." Sold by leading jobbers everywhere.

**THE FAIRBANKS COMPANY**

Branches in Principal Cities  
Eastern Sales Dept.—NEW YORK    Southern Sales Dept.—NEW ORLEANS  
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Auto and truck owners are buying the Rose Tire Pump because they know it **does** make tire pumping **easier** and that they can depend on it. There are over 2,500,000 Rose Pumps in use today. You can make good profits selling Rose Pumps. If you are not selling them, write to your Jobber today for complete information.

Frank Rose Mfg. Co., Hastings, Nebr.

## COFFIELD TIRE PROTECTORS

make any tire wear longer, made of only pure, live rubber — no fabric to cause friction.

*Great Proposition for Dealers*

Write at once to

**THE COFFIELD TIRE PROTECTOR CO.**  
DAYTON, OHIO



Pat. 9-19-'10.

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on the car equipped with  
**UNIVERSAL**

### SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon.

These **INTENSIFIERS** will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

**EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM**

**JOBBER AND DEALERS—Your profit is liberal.**

Write today for our attractive proposition

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OUR LOCATION HAS ENABLED US TO BECOME  
**QUICK SHIPPERS**

**IN EQUIPMENT, REPAIR MACHINERY AND ACCESSORIES  
FOR THE "BIG FIVE"**

**Motor Car—Motor Truck—Tractor—Motor Boat—Aeroplane**

WE ARE TERRITORIAL DISTRIBUTORS FOR  
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AUTOMOTIVE EQUIPMENT

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## SUNDERLAND'S

give satisfaction

MAGNALITE or CAST IRON PISTONS

SPECIAL PRICES ON FORD JOBS

REGRINDING NEW PISTONS

SUNDERLAND MACHINE SHOPS

OMAHA, NEB.

## CYLINDER AND CRANKSHAFT GRINDING

New Oversize Pistons, Rings  
and Wrist Pins

Highest grade machinery and tool equipment, no makeshift tools. This equipment with our years of experience in the automotive business insures you highest grade work at the hands of experts. Work fully guaranteed. Patterns for all pistons, 25,000 piston rings and 5,000 wrist pins in stock. We are the acknowledged leaders in our line.

Aluminite Pistons and Connecting Rods

put six cylinder smoothness into four cylinder motors, give any motor more power, more speed, quicker get away and more miles per gallon with less bearing trouble.

Power Plus Cylinder Head  
for Ford Cars

keeps the motor cool, increases power and speed.

Expert Motor Building and Overhauling

Motors refined and tuned for speed. New and rebuilt motors in stock. Tell us your motor problems. Our increased equipment and space insures prompt service and perfect work.

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We are the biggest wreckers in the world. The size of our business enables us to undersell all competition.

Money cheerfully refunded if you are not satisfied.

We make a specialty of our service to the trade and can supply you with practically any parts you want from stock. Orders shipped the day received. Our stock includes motors, Bosch magnetos, coils, magneto parts, rear axles complete with wheels, differentials, tires, rims, and all other parts.

Correspondence from the trade invited

### WARSHAWSKY & CO.

Largest Car Wreckers in the World

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## Practical Automobile Instruction

fits you for success in this industry of unlimited opportunities. Learn the automobile, truck and tractor business. GREER master methods will make you a trained man—able to earn big money. Our courses cover every branch of the automotive industry. Tuition is moderate.

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1519 S. Wabash Ave., Chicago, Ill.

You Always Get  
Satisfaction When  
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## Hyklas

Valves Tie Rod Bolts  
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You also get Quality Parts, Lowest Prices, Intelligent Service, Prompt Shipments.

## Hyklas

—parts are manufactured to proper quality and dimension standards.

Test our service. Write for particulars.

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Standardized Prices

Material and  
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Modern Equipment

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## Cylinder Regrinding

Standard and Oversize

Pistons -- Piston Rings -- Piston Pins

ALL WORK INSPECTED

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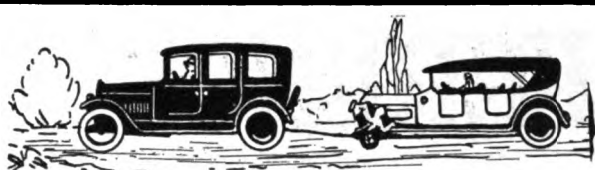
INDIANAPOLIS, IND.

With our

## Bu-Nite Pistons

goes a

GUARANTEE  
of SATISFACTION



## Wrecked!

When you get that call, be prepared to go to the rescue with a

### Holmes Wrecking Truck

You can get the crippled car to your shop quickly and easily. The time and labor saved soon pays for it. Made of the best materials with ample strength for any job.



Write for full information and price

**Robt. Holmes & Bros.**  
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## HARNER'S ALUMIFLUX REPAIRS ALL METALS

All repairs can be made with ALUMIFLUX without removing the part from the car. ALUMIFLUX will work successfully with aluminum, copper, iron (gray, malleable, or galvanized), tin, zinc, lead or brass.

Not affected by gasoline, oil or water, hot or cold. Will stand heat up to 600 degrees and pressure to 250 pounds.

Write for full particulars

**E. C. HARNER MFG. CO.**  
BENTON HARBOR MICHIGAN

## HOLD 'EM IN THE ROAD

Gives the Ford driver better control over his car, preventing breakage, repairs and accidents.

Combines four valuable attachments in one—Radius Rod Brace, Anti-Rattler, Axle Support and Steering Device.

DEALERS—This is the most essential of all Ford necessities. Ask your jobber or write for particulars.

**CASCO MFG. CO.**  
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Other "CASCO" Products  
"CASCO" Fan Belt Guide "CASCO" Oil Drain Cock  
"CASCO" Ford Coil Box Protector

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One qt. kerosene and 6 lbs. air pressure cleans all dirt, grit and grease from engine. Prevents wear, actually saves half the usual repairs. Quick, economical, thorough, easy and cleanly to operate. Necessity for repair shops.

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General Automobile Machine Work, Welding of All Metal—Authorized Ever Ready Battery Service Station—Sheet Metal Work—Manufacturer Catechain Hose Coupling—Sales and Service U. S. E. Shock Eliminators.

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Big commissions can be made selling our new, patented Everlasting Ford Transmission Linings, to Ford dealers, service stations, garages and accessory dealers. A splendid opportunity for side line and specialty salesmen to get in on the ground floor. A few territories still open. Write today for full particulars.

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## FOR SALE: Liquid Cooling Apparatus

Especially designed for automotive engines; a demonstrated success; apparatus does not require a fan for cooling the water. Eliminates trouble and annoyance of clogged cooling system; obviates danger of frozen radiator and tubes. Creates new method for displacing and cooling water. Dispenses with pump. Makes a neat appearance; can be used with any make or design of automotive engine.

Further particulars on request

Box Number 5, care of the  
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### Free Brand New Miller Tube

with each tire purchased from our well known slightly used and demonstrated at such low prices.

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|-------|--------------|-------|--------------|
| 30x3  | .....\$ 6.25 | 30x3½ | .....\$ 7.25 |
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 Beck & Corbitt Iron Co., 1222 No. Main St., St. Louis, Mo.  
 Casco Mfg. Co., Thomasville, Ga.  
 The M. W. Dunton Co., Providence, R. I.  
 New England Mills Co., 1027 W. Van Buren St., Chicago.  
 New Era Spring and Specialty Co., Grand Rapids, Mich.

## AIR COMPRESSORS

Brunner Mfg. Co., Utica, N. Y.  
 Champion Pneumatic Machinery Co., 1402 S. Michigan Ave., Chicago.  
 Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.  
 Gardner Governor Co., Quincy, Ill.  
 General Utility Co., 1324 Ogden St., Philadelphia, Pa.  
 Globe Mfg. Co., Battle Creek, Mich.  
 U. S. Air Compressor Co., 5308 Harvard Ave., Cleveland, O.

## AIR TANKS

Air Tight Steel Tank Co., Pittsburgh, Pa.

## ALIGNING REAMERS

Lewis Tool Co., 612 5th Ave. So., Minneapolis, Minn.

## APRONS

Bailey-Drake Co., 1120 So. Michigan Ave., Chicago.

## AUXILIARY STEERING EQUIPMENT

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 The Norma Company of America, 1790 Broadway, New York City.

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Davies-Young Soap Co., Dayton, Ohio.

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 H. G. Faro Co., 1410 So. Michigan Ave., Chicago.

Lewis Tool Co., 612 5th Ave. Co., Minneapolis, Minn.

Marvel Machinery Co., Minneapolis, Minn.

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 St. Paul Welding & Mfg. Co., 172 West Third St., St. Paul, Minn.

Sawyer-Weber Tool Mfg. Co., 356 S. Alameda St., Los Angeles, Cal.

Stiles Mfg. Co., St. Louis, Mo.

Storm Mfg. Co., Minneapolis, Minn.

Victory Oil Stove Co., 180 W. Austin Ave., Chicago, Ill.

Washburn Burner Corp., Kokomo, Ind.

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Milwaukee Tank Works, Milwaukee, Wis.

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Sheridan Motor Car Co., (Division of Gen. Motors Corp.), Muncie, Indiana.

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National Refining Co., 2003 Rose Bldg., Cleveland, Ohio.

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Green Engineering Co., Dayton, Ohio.

Marvel Machinery Co., Minneapolis, Minn.

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Bailey-Drake Co., Inc. (Sales Dept. for Trione Piston Ring Co.), 1130 S. Michigan Ave., Chicago.

Burd High Compression Ring Co., Rockford, Ill.

Butler Mfg. Co., Indianapolis, Ind.

General Utility Co., 1324 Ogden St., Philadelphia, Pa.

Green Engineering Co., Dayton, Ohio.

Pondelick Bros., Leavitt St. and Jackson Blvd., Chicago.

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Air-Tight Steel Tank Co., Pittsburgh, Pa.  
 Frank Rose Mfg. Co., Hastings, Neb.  
 Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.  
 Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

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Greer College of Motoring, 1519 So. Wabash Ave., Chicago.

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Channon-Hughson Co., 229-233 W. Erie St., Chicago.  
 Philip H. Webber & Co., Hoopeston, Ill.

## SIGNS

Federal Electric Co., Lake & Desplaines Sta., Chicago.  
 Flexlume Sign Co., Niagara St., Buffalo, N. Y.

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M. W. Dunton Company, Providence, R. I.  
 E. C. Harner Mfg. Co., Benton Harbor, Mich.

## SOLDERING OUTFITS

M. W. Dunton Co., The, Providence, R. I.  
 St. Paul Welding & Mfg. Co., 175 W. Third St., St. Paul, Minn.

## SPARK PLUG INTENSIFIERS

Universal Mfg. & Sales Co., 552 W. Harrison St., Chicago.

## SPRINGS

Garden City Spring Works, 2900 Archer Ave., Chicago.

Harvey Spring & Forging Co., Racine, Wis.

Jenkins Vulcan Spring Co., 1402 Chestnut St., St. Louis.

New Era Spring and Specialty Co., Grand Rapids, Mich.

## TESTING INSTRUMENTS

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 Weston Electrical Instrument Company, Newark, N. J.

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J. W. Duntley, 1011 Michigan Ave., Chicago, Ill.

## TIMING DEVICES

Henry Kastens, 419½ W. 27th St., New York City.

## TIRES

Brunswick-Balke-Collender Co., 623-623 S. Wabash Ave., Chicago, Ill.

Leo McDaniel Rubber Co., Cairo, Ill.

## TIRE PROTECTORS

Coffield Tire Protector Co., 31 Court St., Dayton, Ohio.

## TIRE PRESSURE REGULATORS

Automatic Safety Tire Valve Co., 1753-1755 Broadway, New York City.

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C. A. Shaler Co., Waupun, Wis.

Zinke Co., 1323 So. Michigan Ave., Chicago.

## TIRE RENEWING AND EQUIPMENT

Motor Salvage Co., 1602 Michigan Ave., Chicago, Ill.

Leo McDaniel Rubber Co., 804 Commercial Ave., Cairo, Ill.

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 A. Schrader's Son, Inc., 752-756 Atlantic Ave., Brooklyn, N. Y. (Automatic Inflating Valve)

## VALVE GRINDERS AND TOOLS

American Valve Tool Mfg. Co., 354 W. 50th St., New York City.

Eclipse Valve Grinder Co., Dept. C, 20th St. at Oak, Kansas City, Mo.

## VULCANIZERS

C. A. Shaler Co., 353 Fourth St., Waupun, Wis.

Wood-Craft Co., 1485 Marshall Ave., St. Paul, Minn.

## WELDING EQUIPMENT

The Imperial Brass Mfg. Co., 1224 W. Harrison St., Chicago, Ill.

St. Paul Welding & Mfg. Co., 172 W. Third St., St. Paul, Minn.

Washburn Burner Corp., Kokomo, Ind.

## WIRE AND TERMINAL GUARDS

J. W. Duntley, 1011 Michigan Ave., Chicago, Ill.

## WRECKING TRUCKS

Robt. Holmes & Bro., Danville, Ill.

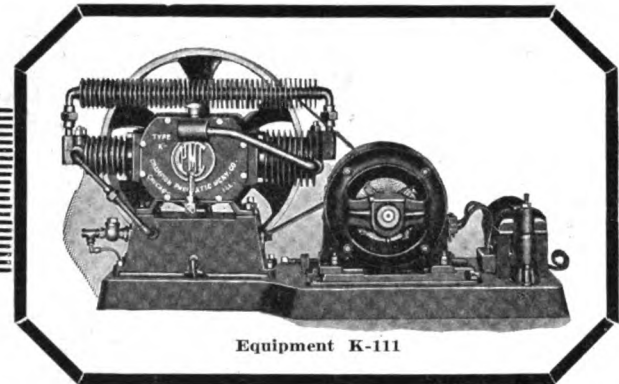
## WRENCHES

The Graham Roller Bearing Co., Coudersport, Pa.



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Equipment K-111

## Use your own tank with this CHAMPION-AUTOMATIC Air Outfit

It is not necessary to buy a new or special tank in order to install the outfit as illustrated above. The tank you now have will do very well.

Equipment K-111 includes a Champion Two-Stage self-oiling air compressor as illustrated, belted to a ½ H. P. Motor for any current; all mounted on a metal base, complete with filtering trap, check valve, belt and automatic belt tightener; automatic controller including our automatic pressure and moisture release; all complete and ready to run when attached to electric current.

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Champion Air Compressors are equipped with a Standard Ball Bearing crank shaft.

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Let us send you literature.

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34 TYPES TO  
SELECT FROM

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UNDERWRITERS  
LABORATORIES

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TANKS - 60 TO  
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SPECIAL  
PROPOSITIONS  
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WRITE TO DAY  
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TANK WORKS**  
MILWAUKEE, U.S.A.

America's Aviators Used

# BURD

## High Compression PISTON RINGS

*The Standard of Efficiency*

BURD HIGH COMPRESSION RING CO., Rockford, Ill.

# 6,000 Gallons a Day Delivered to Ford Cars By 3 VICTORY VISIBLE Pumps

Read the following story from the May 26th issue of National Petroleum News:

## SERVICE STATION STARTS THOUSANDS OF NEW FORDS ON THEIR WAY HOME

Detroit, May 14—More gasoline is put out daily by the Wayside Service Station, on Woodward Avenue, opposite the Ford Factory, than by any other service station in the country, it is likely, certainly more than thru any other station of its size.

On many days during the past two months this station, thru three pumps, has put out better than 6,000 gallons of gasoline.

The reason is this: Since the switchmen's strike interrupted the freight movement, purchasers of new Ford cars and agents in other cities in many cases have been driving their new cars home from the factory, rather than trust to their delivery by railroad.

The Ford cars as they leave the plant have neither oil nor gasoline to carry them very far and their drivers almost without exception stop at the Wayside Service Station across the street to fill up before starting to drive home.

### And Every Customer Saw What He Got and Got What He Saw

Mr. Dan T. Tracy, one of the partners in the Wayside Service Station, writing to an inquirer last February said:

"We have three Tokheim Pumps in operation at our service station which dispenses more gas than any other filling station in the city of Detroit. These pumps give the customer full measure, causing the friendly co-operation of all patrons. Satisfied customers are the best kind of advertisements. Our average gallonage during the pleasant weather is 4,500 gallons of gas a day, and the combined reading of our three pumps up to date is 571,801 gallons. Two of the pumps have been operated a year, and the other nine months.

"We formerly used three men at our station, but two men with the Tokheim Pumps are able, now, to give the same service as three men gave with the five-gallon stroke hand pumps. Customers are pleased with the visible containers of the Tokheim Pumps, because they see and get exactly what they pay for.

"We think so much of Tokheim Pumps that we use the name 'Tokheim' on our cards and literature."

## Tokheim Oil Tank & Pump Company

Ft. Wayne, Indiana





EFFICIENCY SEZ -

# Akkurate

LOOSE LEAF

**GARAGE  
SYSTEMS  
make  
BOOKKEEPING  
A PLEASURE**

There is no burning of midnight oil for the bookkeeper where the AKKURATE SYSTEM is used. Half of the time and the hardest part of the work are completely eliminated. The bookkeeper who used to put in many a weary evening at his desk has lots of time during business hours for other work after the AKKURATE SYSTEM is installed.

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**INVESTIGATE AKKURATE SERVICE.**  
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403-5-7 Broome Street  
NEW YORK CITY





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NOKORODE is absolutely non-corrosive and harmless to metals. Yet it is as easily applied as acid and performs its function with a thoroughness that will satisfy the most exacting requirements.

NOKORODE is especially valuable on automobile work and is used by progressive repairmen everywhere. They know that there is no soldering flux that gives the service, efficiency and security afforded by NOKORODE.

Sample and particulars on request

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PROVIDENCE, R. I., U. S. A.



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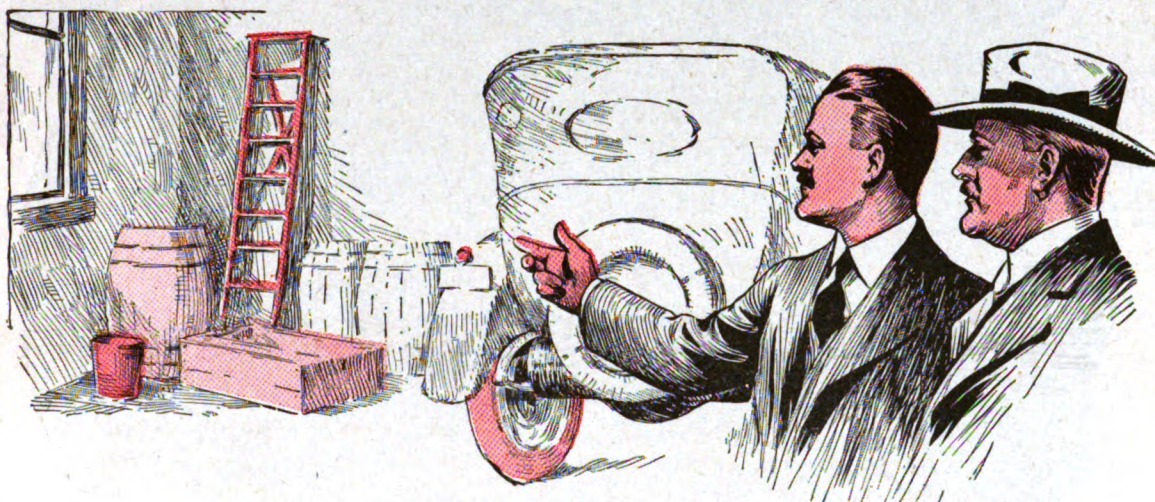


# American Garage & Auto Dealer

Published Monthly  
116 So. Michigan Ave.  
CHICAGO, ILL.

NOVEMBER 1920

Vol. 11—No. 11,  
10 Cents the Copy  
\$1.00 Per Year.



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With the SHALER Vulcanizer you can repair 12 casings and 200 tubes a day. You know what the charge is for this work. Figure out for yourself how much money you can make!

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is the simplest, most compact vulcanizer on the market. Takes up no more room than a bicycle, and you can move it around at will. Has Automatic Heat Control, so you don't need to watch or regulate it. It's SAFE and sure—must vulcanize just right.

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C. A. SHALER CO.

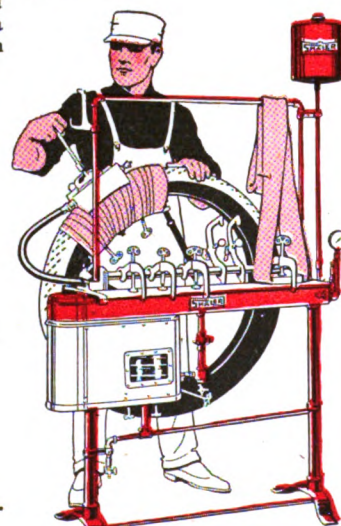
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360 Fourth St., Waupun, Wis.

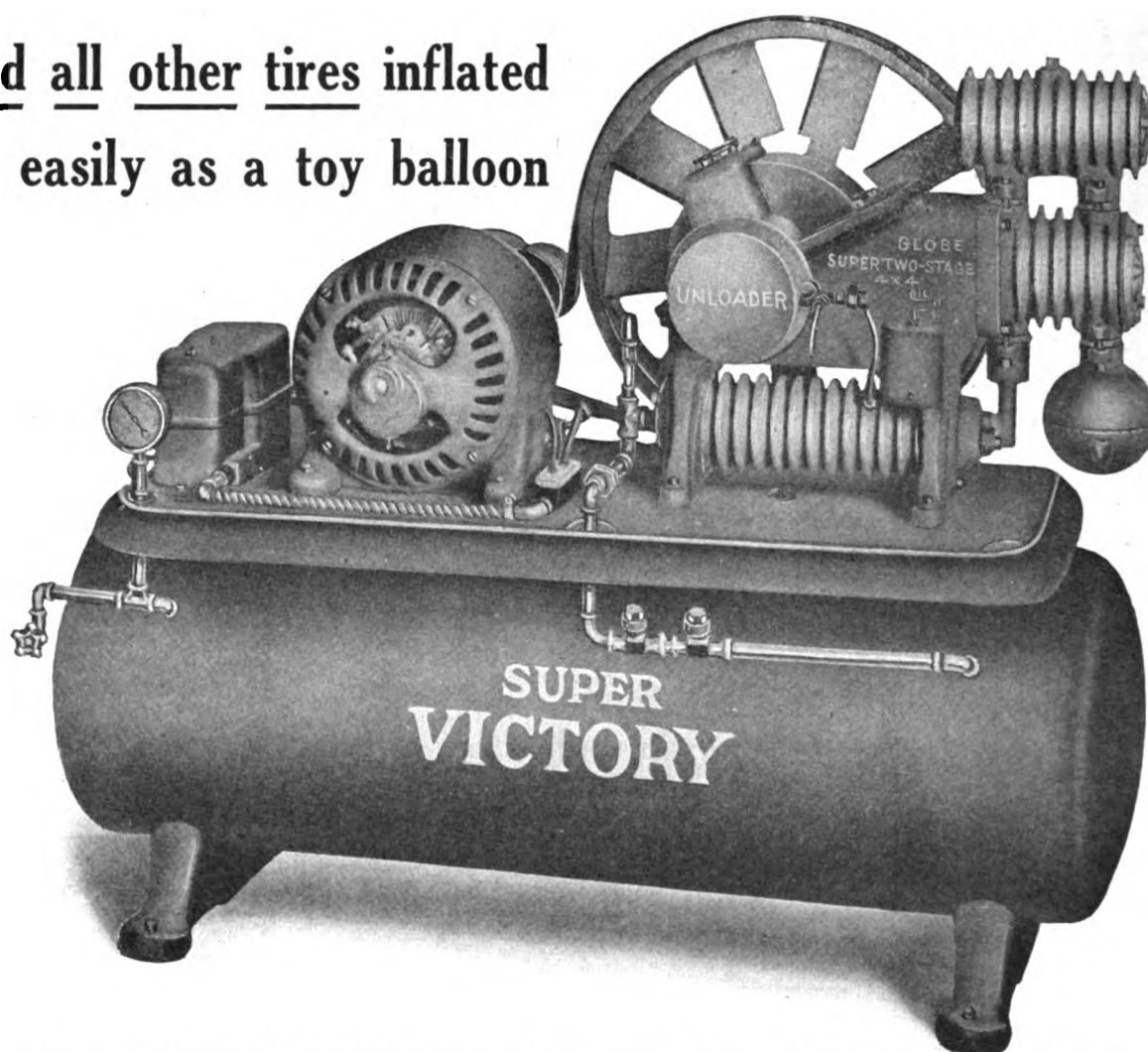
Oldest and Largest Manufacturers of Vulcanizers in the World





# GIANT PNEUMATICS

and all other tires inflated  
as easily as a toy balloon



## An Old, Old Idea with a Brand-New Setting **GLOBE SUPER TWO-STAGE**

A Two-Stage Compressor having but a single light weight piston, only one cylinder, one connecting rod and no stuffing boxes. It combines all of the desirable features of both single-stage and all other types of two-stage compressors, without having any of the undesirable features of either.

In every detail of design and construction GLOBE SUPER TWO-STAGE COMPRESSORS equal or surpass the best Auto-Motor practice and will, therefore, stand up indefinitely under the most exacting service conditions. Scrupulous care has been given to every slightest detail.

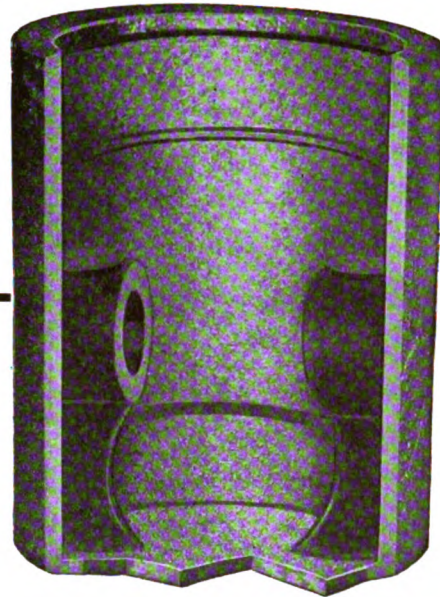
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YOU CAN FORGET YOUR COMPRESSOR TROUBLES FOR ALL FUTURE TIME BY ADOPTING THE GLOBE SUPER TWO-STAGE.

When in Chicago, do not fail to see the **SUPER TWO-STAGE** in action at our show room, 1537 South Michigan Ave.

**YOU CAN'T AFFORD TO MISS IT**

**Globe Manufacturing Company, Battle Creek, Michigan**



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Piston looks—*

*It's how a Piston  
acts that counts.*

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**for wear—for use—for service**

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We have patterns on hand for 2500 makes of internal combustion engines and can make prompt deliveries on castings in the rough—semi-finished—or finished.

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Perfect Piston*

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Minneapolis, Minn.



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Serviceability reveals itself to no mere superficial examination. It demonstrates itself by the hard, cold facts of performance. And records of performance done tell what records of performance may be anticipated. For years past, "NORMA" Precision Bearings have been—as they are today—the standards in the high-grade ignition apparatus and lighting generators identified with cars, trucks, tractors and power boats having the most consistent records of high-duty performance.

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## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# American Garage & Auto Dealer

*Published Monthly*

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**SPINDLE CONNECTING ROD (OR TIE ROD) BENT FROM THE STRAIN OF SHOCKS AND JOLTS WHICH WEAKENS THE ENTIRE FRONT SYSTEM AND THROWS THE FRONT WHEELS OUT OF ALIGNMENT**

**STEERING CONNECTING ROD BENT FROM STRAIN OF SHOCKS AND JOLTS AND THE DANGER OF GOING OVER CENTER TRAVEL WHICH MEANS THE LOSS OF CONTROL IN**

**SPINDLE CONNECTING ROD (OR TIE ROD) RELIEVED OF THE STRAIN FROM SHOCKS AND JOLTS WITH THE OVER-LAND GUIDE**

**STEERING CONNECTING ROD REMOVING DANGER OF GOING OVER CENTER TRAVEL PREVENTED BY**

**The Over-land-Guide**  
PATENTED  
*Controlling the Ford*

**A Ford Controlling Itself**

## To Appreciate the OVER-LAND GUIDE You Must Use It Yourself

Then you will fully appreciate the advantages afforded by it. Order one today in accordance with our guarantee printed on the right side of this page. After installing the OVER-LAND GUIDE on a Ford car or truck, give it a severe test and try-out. Drive the car over the roughest roads you can find and when you strike a hole six or seven inches deep, remove your hands from the steering wheel, regardless of the speed you are driving. Then you will realize how the OVER-LAND GUIDE controls the running of the car, absorbs all shocks, and eliminates the strain and vibration from the front system and steering mechanism.

This broad guarantee protects users of the Over-Land Guide. Send us retail price, \$8.50 and we will send you, parcel post, one Over-Land Guide. Use it 20 days, properly installed, and if at the end of that time it does not do all we claim for it, full purchase price will be refunded.

## This Wonderful Steering Shock Absorber Is a Big Money Saver

### PREVENTS ACCIDENTS AND SAVES LIVES

The OVER-LAND GUIDE gives you the best insurance against danger of accident and destruction of your Ford car or truck through the loss of control caused by the steering connecting rod passing over center travel in short turns. The OVER-LAND GUIDE will eliminate the danger of ditching and collision with the possibility of fatal results to the occupants and the destruction of the car even though the steering mechanism be broken or fails to work. Your steering gears may get out of service, or the steering connecting rod may become locked over center travel, but the OVER-LAND GUIDE, with its grip on the rod and axle, will hold your car in the middle of the road until it is brought to a safe stop, avoiding the possibility of being ditched or destroyed.

### PREVENTS REPAIR BILLS AND SAVES MONEY

The OVER-LAND GUIDE also reduces breakage and repairs of all the following parts—such as spindle connecting rod (or tie rod). Spindle body arms and bushings. Spindle body and bushings. Ball and roller bearings and hub. Steering connecting rod and ball joints. Steering gear drive pinion and steering gear pinions. Steering gear internal gear case and bushings. Also prevents the axle from bending—and may save your entire car from destruction with loss of life of occupants.

The OVER-LAND GUIDE removes the strain from the arms and shoulders of the driver. It gives him a degree of comfort that no Ford driver ever hoped to attain. It also stops the wobbling and scooting of the front wheels that is a continual source of annoyance.

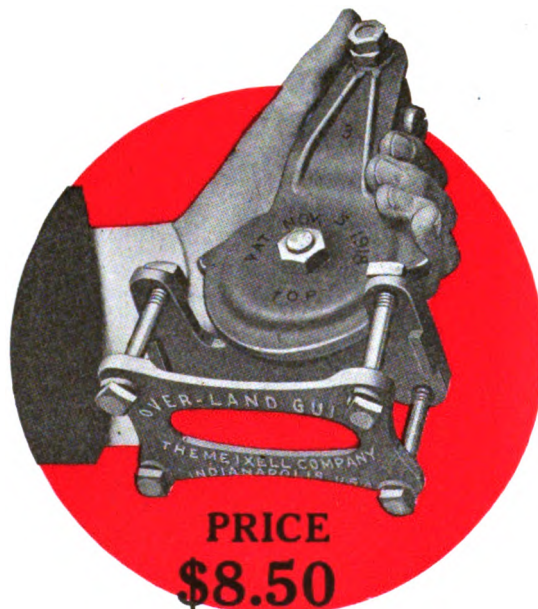
We will ship you one parcel post for \$8.50.

DEALERS—When you have tested the OVER-LAND GUIDE, you will be able to sell it to your customers. Order one today and let us send you our liberal trade offer.

## THE MEIXELL COMPANY

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Foreign Distributors—Automobile Sundries Co., 79 Walker St., New York, N. Y.



In ordering state the year your car was made.

Unlike all other STEERING DEVICES, the SPRING in the Over-Land Guide is packed in hard grease and completely enclosed, which keeps it free from dust and moisture and means indefinite service and no up-keep.

Maybe you don't realize it, but it's true—your store is making new friends all the time, and pleasing old ones better, because you sell goods advertised in The Farm Journal.

Right within the trading radius of your store there are hundreds—it may be thousands—of Farm Journal readers. We'll tell you how many, if you ask us.

It reaches more American farm homes than any other paper, is kept from month to month, read and re-read, and depended upon.

*What advertising influences your customers most? Naturally, the advertising in the publications they read. Check up the circulation of general magazines and farm papers in your community! You'll get some valuable information on the value of farm paper advertising to you.*



“Unlike any other paper”

# The Farm Journal

CHICAGO PHILADELPHIA NEW YORK

Sells Most Goods Because  
Read by Most Farmers

**Simplex Ironer**  
“THE BEST IRONER”

**Hanes**  
Old Trusty

**NONE SUCH**  
MINCE MEAT

**FARMOGERM**

**INTERNATIONAL**  
ONE PIPE HEATER

**Carey**  
ROOFINGS

**TOP NOTCH**  
BEACON FALLS  
RUBBER FOOTWEAR

**Float-a-Jord**

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Satisfaction Guaranteed or Money Back

**CROMPTON**  
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**Goblin Soap**

**Save the surface and  
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**MUSTEROLF**

**PORTLAND CEMENT**

**CHASE**  
FURWOVE  
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**Natco Hollow Tile**

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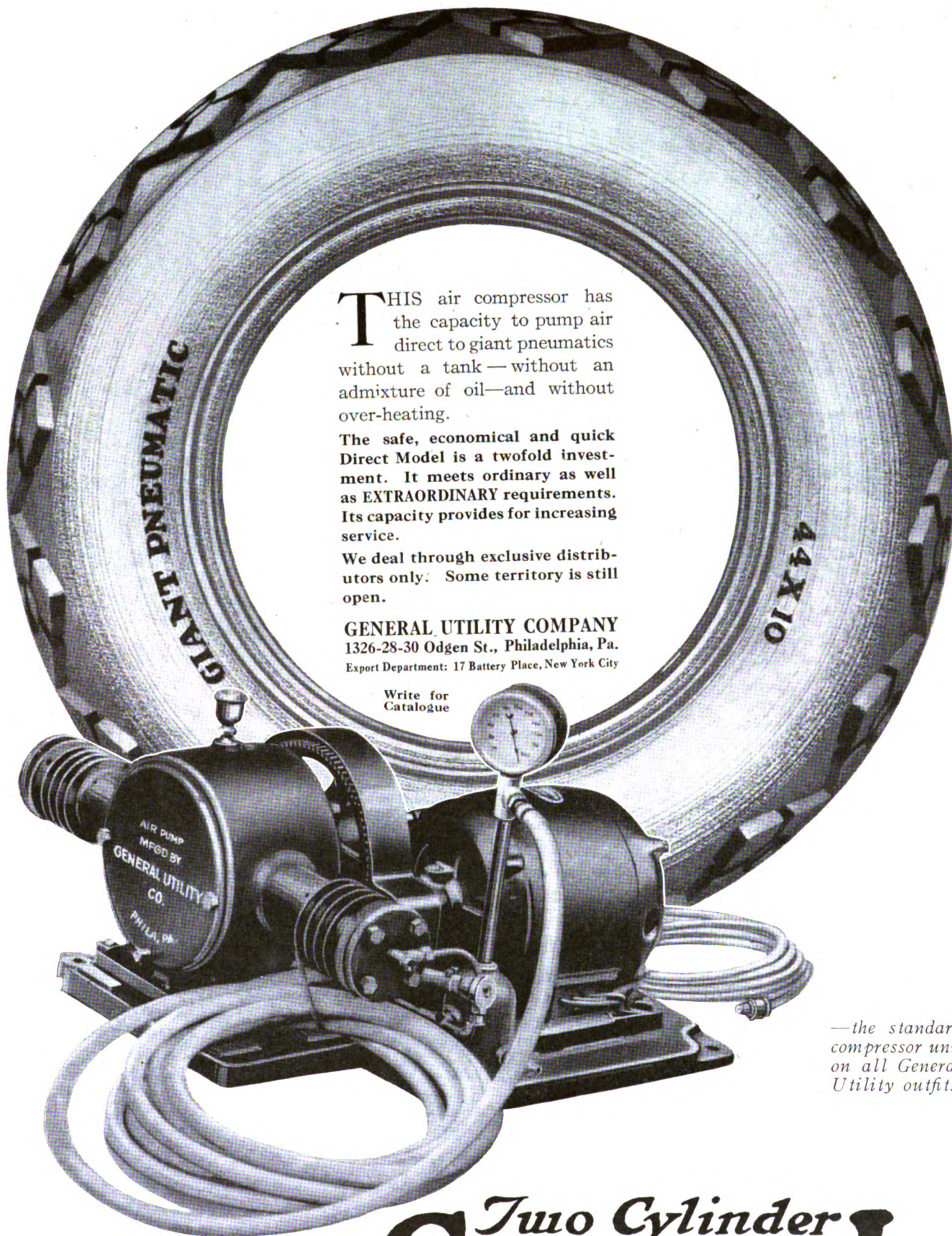
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**AMUTH-PROUTY CO.**

**A Kalamazoo**  
Direct to You

AMERICAN CHAIN COMPANY, Inc.





**T**HIS air compressor has the capacity to pump air direct to giant pneumatics without a tank—without an admixture of oil—and without over-heating.

The safe, economical and quick Direct Model is a twofold investment. It meets ordinary as well as EXTRAORDINARY requirements. Its capacity provides for increasing service.

We deal through exclusive distributors only. Some territory is still open.

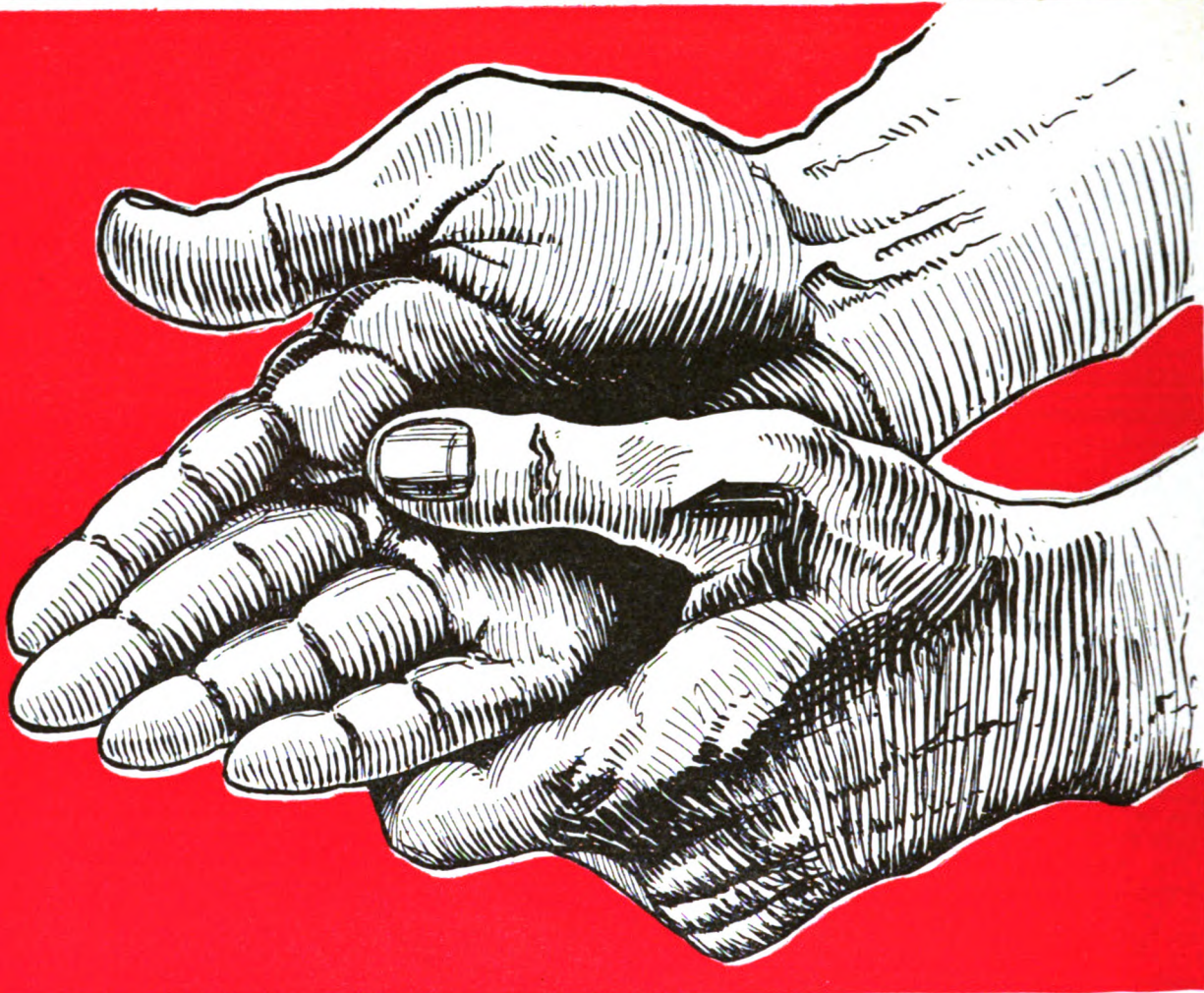
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Export Department: 17 Battery Place, New York City

Write for  
Catalogue

—the standard  
compressor unit  
on all General  
Utility outfits.

# *Two Cylinder* **GENERAL** **AIR COMPRESSORS**





### **SPEE-DEE** in your garage

will prove to be an exceedingly valuable helper. Nothing equals it for washing automobiles, bodies, tops, seat covers, celluloid curtains, fenders, wheels, trucks—everything. Does not scratch or injure any surface.



### **SPEE-DEE** for your customers

Just show any car owner what SPEE-DEE will do—he'll buy a can readily and he'll come back and buy more. Whether he cleans his own car or not he will need it to wash his hands after making roadside repairs.

## **CLEAN HANDS AFTER DIRTY WORK**

SPEE-DEE cleans greasy, grimy hands—with or without water—an invaluable quality when a motorist or driver has been making a roadside repair in cold weather. About a teaspoonful, well rubbed in will remove all grease and dirt in a jiffy. If water is not convenient, wiping the hands with a cloth or waste is all that is required to finish the job.

**SPEE-DEE** is a good seller at all times—especially in winter. Dealers' profits are liberal.

Write today for complete information.

**STATES CHEMICAL COMPANY**

680 W. Austin Ave.

CHICAGO, ILL.



# American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,  
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol XI. No. 11

CHICAGO

November, 1920

## Better Business Ahead.

Election is over and the business men of the country now look forward to settled and stable conditions of business.

Always in the year of presidential elections there has been a slowing-up of general business. This year was no exception, but other causes entered to accentuate it. In the automotive industry, the action of the Federal Reserve Board in restricting credits aided in producing a slump which caused considerable alarm and brought some companies close to receiverships.

However, the skies are clearing and manufacturers are looking forward to, and preparing for, a period of constructive business expansion. It is reported that plans are being laid by some of the most substantial car manufacturing companies for a production in 1921 of 30 to 40 per cent above that of this year.

Reports from Detroit and other automotive centers indicate that the low point of the depression in the industry has been reached. Optimism is quite prevalent, the general feeling being that the worst has passed and that the industry is now in for real substantial prosperity along with all other lines of business.

## Business of Today.

The sales manager was talking to a group of friends regarding "Business of Today." His specialty is music—phonograph records. Said he: "So

### "A Song for the Roll Call."

Somebody said that it couldn't be done,  
But he with a chuckle replied,  
That "maybe it couldn't," but he would  
be one  
Who wouldn't say so till he tried.

So he buckled right in with a trace of a  
grin

On his face. If he worried, he hid it—  
He started to sing as he tackled the thing  
That couldn't be done—and he did it.

Somebody scoffed: "Oh, you'll never do  
that—

At least no one ever has done it;"  
But he took off his coat and he took off  
his hat,  
And the first thing we knew he'd be-  
gun it.

With a lift of his chin and a bit of a grin,  
Without any doubting or quiddit;  
He started to sing as he tackled the thing  
That couldn't be done—and he did it.

There are thousands to tell you it cannot  
be done,  
There are thousands to prophesy fail-  
ure;  
There are thousands to point out to you  
one by one,  
The dangers that wait to assail you.

But just buckle in with a bit of a grin,  
Then take off your coat and go to it;  
Just start in to sing as you tackle the  
thing

That "cannot be done"—and you'll  
do it.

—American Red Cross Speakers' Bulletin

long as the housewife has money, we are going to get it. We do not believe in the 'hire and fire' method in employing salesman. We 'refire' them."

Then he told how one salesman came to him very much discouraged and how he "refired" him. In one of the manufacturing towns in Massachusetts everything was shut down, some 10,000 persons being out of work and everything was gloomy, according to the local music dealer.

The "blue" salesman was told to go to that city and sell more music than had ever been sold there before. He spent several days thinking about the proposition and then went there and analyzed the situation. Then he got busy.

The result was that the local music man did 400 per cent more business than during his best Christmas season and his furniture sales—he also was in the furniture business—increased 200 per cent. And this right at the time of depression in that city. The salesman came back to the home office very much enthused, "refired," ready to go to other places where depression in business prevailed.

Golf is played by many men. Recently a foursome came to a water hazard in the course. Immediately they all reached for their bags and drew out floaters and old balls. All except one, who brought out a brand new ball—a "50," a heavy ball—and he was not a very good player. They took the hazard and only one got across—the man using the heavy ball.

Three of the four golfers prepared for failure and they were not disappointed. The fourth one broke away from precedent and prepared for success, and he was successful. So it is in business—get away from precedent and do not prepare for failure.

The sales manager found a merchant selling a certain article for nine cents, which represented no profit, but he defended his course by stating that it would bring business to his store. The

sales manager entered into a contest with him, the merchant to sell the article at his price of nine cents for a certain period, and then the sales manager to sell at an increased price for the same period.

The merchant increased the sale of the article about 100 per cent at a price of nine cents, with no profit to himself. The sales manager, in his turn, sold the same article at eleven cents and increased the sale 200 per cent. Why? Because one understood people and the other did not. With the article priced at nine cents, people thought it was marked down from ten—but when it was priced at 11 cents, they thought it was marked down from 15, and was, therefore, a greater bargain.

When the mountain would not come to Mohammed, Mohammed went to the mountain. So also where housewives cannot get to market places certain merchants are using motor trucks displaying their goods, as in show windows, and driving them to the housewives. This is "Business of Today." Sales must be made and "so long as Mrs. Housekeeper has money we are going to get it." This is the spirit which wins.

How much of your business, Mr. Garageman, and Mr. Auto Dealer, is in the final analysis controlled by Mrs. Housekeeper? Think it over!

### Getting the Crops to Market.

It is a great problem to get farm produce to market without much lost motion. Owing to the scarcity of farm labor resulting from the farm-to-city movement and the lack of facilities for direct trading between the farmer and the actual consumer of his crops, there is every indication that the farmer must have help. And any assistance given this real guardian of the public welfare necessarily involves more and better roads and improved highway transport.

Edward N. Hines, chairman of the Wayne County, Mich., board of road commissioners, who has made a care-

ful study of highway transportation problems, says:

"This is a wheeled hour. We are now entering on a period in our transportation era when the waste entailed by awkward and unnecessary handling and transporting of the products we buy and sell is to be eliminated. Railway lines already bind our great commercial and manufacturing centers together. We have progressed, however, to a point where we must get back and pick up the loose ends of our transportation system. We must extend corollary lines into local zones to feed, clothe and otherwise minister to the needs of the public."

Many farmers are far from the railroads. They start from home with a wagonload of produce, and when they reach their destination, after traveling a day and a night, are told that their cabbage and apples are not wanted. What the farmer needs is motor transportation.

It is claimed that a truck on the farm will replace from two to four men, carry twice the load in half the time, release five acres of land, transport live stock with a saving in weight over rail transportation, reduce hauling costs, shorten the miles to market, cut feed bills in half and meet 99 per cent of all hauling costs.

A farmer in Nebraska, unable to obtain cars from the railroad to ship his wheat to market, and with the local elevators filled to capacity, loaded 110 bushels of wheat on his two-ton truck and hauled it to Omaha, a distance of 480 miles.

The trip required three days, without night traveling, and the total expense was \$22.09, or about 21 cents a bushel. The wheat sold on the Omaha market for \$2 a bushel, which he said insured him a good profit over the price he would have received by selling at any elevator in his home town and allowing for the elevator profit and freight rates. The freight rate is 17 cents a bushel.

This farmer stated that a truck train of over 15 machines, many of which could haul trailers, is contem-

plated by farmers in his neighborhood in order to get their crops to market. On his return trip, this man hauled a cargo of apples from eastern Nebraska for distribution among his neighbors in the western part of the state.

This is only one instance of what the motor truck has accomplished and can accomplish.

The greatest gain in automobile ownership in the United States in 1919, according to figures compiled by the National Automobile Chamber of Commerce, was in the cotton growing states of the South. These figures indicate a good roads movement and an appreciation of the value of time saved in highway transportation.

We must get the crops to market. Isn't the motor truck the logical solution of the problem?

### Credit Customers?

Are you one of the many who sell their goods on time?

Have you from \$100 to \$1,500 or more of bad accounts on your books?

Do you pretend to sell on 30 days' time and then carry accounts from five to six months?

Do you let a customer buy \$10 worth of merchandise and then accept \$5 to apply on account at the end of the month?

You certainly never would have had \$1,500 worth of uncollectable accounts on your books or permitted any breach in your credit rules, if you had had figure records that told you every day just how you stood. Such information would have showed you when to curtail credit, when to speed up collections, and when to do a great many other things that are usually neglected by those who do not realize the value of figure facts.

Knowledge of this kind, when properly applied, will help to keep any business on the paying side of the ledger, for when a dealer knows the facts, he is pretty sure to find ways and means of using them to increase his profits, whether it be by better credit methods or by better selling methods.

# Fords—Service—and Real Success

If Part of Your Building Blew Away in a Gale, What Would You Do?—The Southwestern Sales Company Began to Sell Fords—Adopted a Policy of Prompt and Efficient Service—And Moved Into a New \$60,000 Establishment

By K. H. Lansing

Standing where three streets meet in West Philadelphia, the Southwestern Agency, Inc., is a notable example of a successful Ford agency. The concern began as a garage on part of the present site and was doing so well for the district, harboring more than 200 cars, that at the time the Ford agencies were being given out in 1916, the owners were solicited to take an agency.

After numerous obstacles, including the blowing down of a part of the structure in a high gale, the company, in March, 1918, opened for business in its present \$60,000 building of two stories and basement, which occupies a site 55 ft. by 125 ft. Here the business has prospered more than ever, indicated by the fact that a minimum of \$100,000 worth of stock is on hand. The Southwestern carries the largest stock of any Ford agency in Philadelphia, having an especially big commercial body department from 70 to 90 truck bodies always being on hand.

There is an adequate force of 15 shopmen, two demonstrators and salesmen according to the season.

Departments of the business are:



The Brick Structure is Situated in a Strategic Position, Where Three Streets Meet.

Sales of commercial bodies and trucks.

Sales of new and used cars.

Sales of automotive equipment and a small quantity of tires.

Sales of Fordson tractors.

Sales of genuine Ford parts.

Sales of Fordson tractor parts.

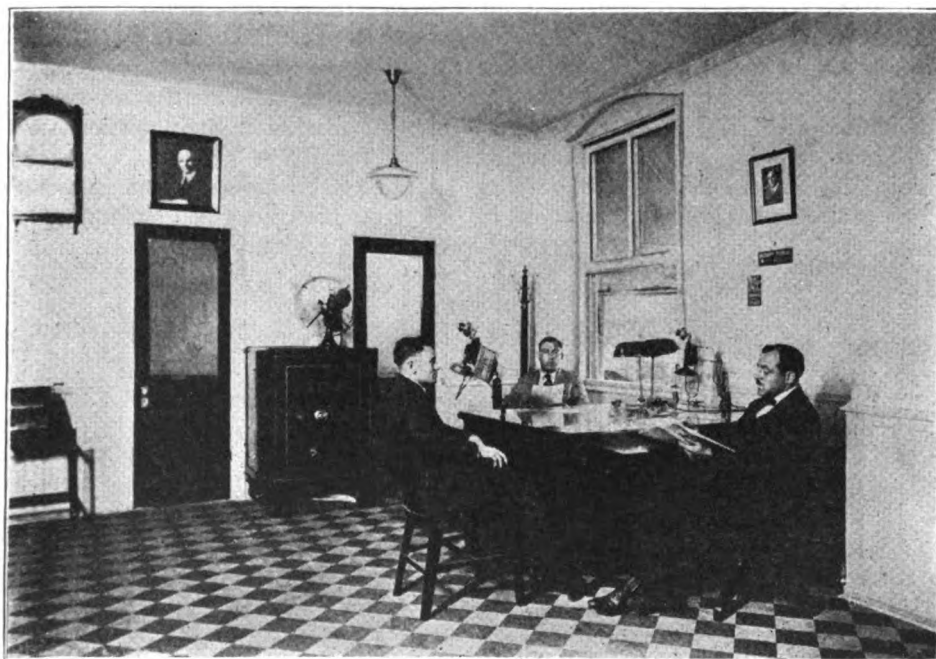
General repairs and service for passenger cars, trucks and tractors.

Sales of oils, greases and gasoline.

Like other Ford agencies, the Southwestern has taken on the Fordson tractor and soon will have a special service car for it, in addition to the two service cars now in use.

A special drive is being made by the company to sell Fordsons for industrial uses, soliciting contractors, lumber-yard owners, builders, foundries, steel mills, dry docks and the like, as well as for farm work. The present plan is to show how the Fordson tractor can be utilized as the latest labor-saving industrial tool where power is required. The location of the agency is favorable for the sale of a tractor for industrial uses. A tractor has been placed in one of the large show-windows in the salesroom, where it attracts considerable attention.

The salesroom occupies space 35 ft. by 50 ft. and has notably attractive features. The floor is of tile and tessellated inlay. The semi-direct system of lighting is used. There is a large showcase for the display of automotive equipment, a wire wheel stand, and a handsome table with catalogs and general advertising literature, and many styles of cars on display.



Officials in Conference in the Complete and Well-Furnished Private Office.

The building, a handsome brick structure, has four large show-windows on the first floor—three in front and one on the side—and four large show-windows in front in the second story, for the display of commercial bodies, which are easily seen from the three streets.

There are two offices in the rear of the showroom, one for the office manager, bookkeeper, cashier and the transaction of general office business; and the other for the officials of the company, namely, A. Sharp, Bernard Wilensky and Harry P. Sharp. The appointments are complete.

A two-ton electric elevator in the rear of the sales-room and office is used to raise and lower commercial cars to and from the second floor.

On the second floor, in addition to assembled commercial cars, are kept the large stock of commercial bodies, up-ended in rows, to save space, and, in special partitioned stockrooms, such stocks as wheel rims, car parts, tires, oils and greases. New and used Ford cars are also kept on this floor as reserve stock.

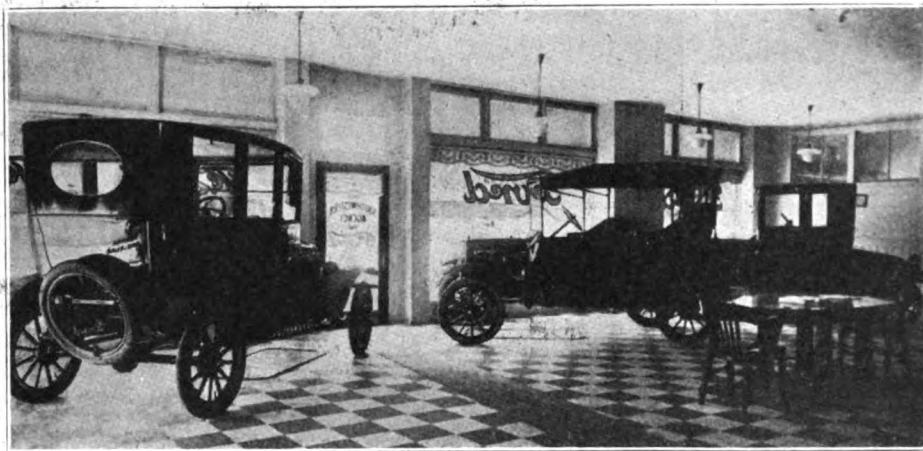
The shop, in the rear of the sales-room and offices, on the first floor, is noted for its excellence of equipment. Here the system is such that cars brought in for motor repairs at 8 a. m., are delivered in perfect order by 5:30 p. m. This system is one of the company's chief sources of pride.

A heavy-duty overhead double carrying track runs the length of the

shop, 75 ft.—so that heavy parts can be conveyed in logical sequence past the various benches and stands used in making repairs. There are chain hoists, fore and aft, to facilitate lifting and conveying operations.

The sequence of work on motor repairs in this shop is as follows:

The car is brought into the shop, the motor is removed and rushed on the overhead carrying track to the motor stand, where it is cared for with motor lifting tongs at the special motor bench, equipped with every known modern device for repairing motors.



Broad Windows Admit Light to the Handsomely Appointed Salesroom.

One man overhauls the transmission; another takes the motor apart, rebore and babbitts it. New pistons, perhaps, and new connecting rod are put in place. Motor and transmission are then reassembled and the motor is conveyed to the running-in and burning-in stands. There is always a test of an hour at the running-in stand. If, at the end of this time, the motor sounds right to the experts, it is then replaced in the car and the car is delivered.

Some reboring and rebabbitting is done in the basement. The benches have raised platforms in the shop, to

eliminate strained positions from leaning over work.

Most of the equipment is of the standard type. There are two drill presses, one of 20 and the other 16 inches, an arbor press, several motor stands, an electric grindstone, a press for straightening cranks, shafts and axles, a connecting-rod liner, piston clamps, motor clamps, transmission reaming outfit, half a dozen garage vises, and a system of reel lights.

There are three general utility motors of 10, 5 and 3 horsepower, respectively and a battery charging system that takes

care of 50 batteries at one time.

The building is steam-heated and the shop windows are protected with heavy wire screens. Each work bench has its individual electric lamp and the general lighting system is of the best.

The shop floor is kept clear of any obstructions

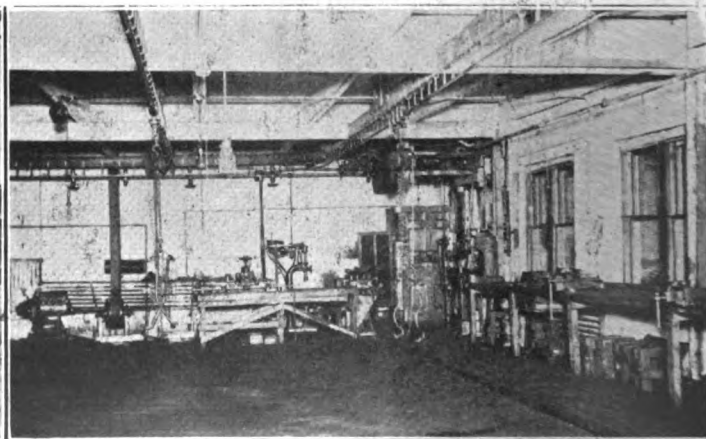
and only working equipment is allowed to clutter the floor. Workers are also urged to keep workbenches as sightly as is possible.

No garage, or storage business is done by the enterprising owners of the Southwestern Agency.

The cars which are waiting for repair, or immediately finished, are lined up on the wall farthest from the actual working part of the shop.

Passenger cars, trucks and tractors are repaired for their owners with equal facility.

The establishment is indeed a notable example of a Ford agency.



A Line of Cars Awaiting Repairs. The Overhead Carrying Double Tract Saves Much Time in the Repair Shop.



# Making the Dealer's Christmas Pay

There Is No More Acceptable Christmas Gift for a Car Owner Than Some Desirable Accessory—Many Dealers, However, Don't Realize That They Have Gifts to Sell—Why Not Make Some Good Strong Appeals to Shoppers?

By Fred Counterman

A good many garage operators and dealers in automobiles and accessories look upon Christmas merely as a holiday and never think of the season as connected with business possibilities for them. They do not realize that they have anything to sell that might be made to serve as a Christmas present, except that once in a great while someone buys an automobile for a Christmas gift.

As a matter of fact, there is nothing that makes a better or a more acceptable present for the owner of a car than some desirable accessory, and in families where the giving of useful gifts is the habit—as it is in many in these days—that accessory may be of the most essentially utilitarian sort and nothing more unique than a new tire.

What are some of the things that people who have cars want? Flashlights, spotlights, trouble lamps, klaxons, motor robes, radiator covers, pumps, jacks, fine tools, tire gages—pretty nearly anything you can use to advantage around a car that is not already a part of its equipment.

When anyone wants to give a motorist something he or she needs and really wants, there is no better bet than something for the car. With nine automobile owners in ten, the car is something of a fad and a good deal of a pet. And there is always some new convenience or bit of equipment that will be appreciated by even the tenth man.

Most men who have cars would rather have a new quick-acting tire pump for Christmas than a hand painted ink-well, or a sky-blue necktie, or a box of department store cigars.

Since most of the Christmas gifts for men are bought by women, it is necessary that the advertising of such things as you want to sell for that purpose shall be advertising made to appeal to the women. Plenty of women who are anxious to get something that men will like never think of looking for a suitable gift at a garage or accessory dealer's, because such concerns are not advertising their lines at Christmas time and other stores are

filling the papers with publicity about the usual run of Christmas stock.

Don't lose your share of the holiday business just for lack of telling people what you have that will make good presents! Put some of the Christmas spirit into your advertising and line up with the rest of the business houses selling holiday goods.

Advertise that you have the kind of things that make the best sort of presents for automobile owners. It will pay you to get out a form letter in imitation typewriting and send it to a mailing list of the women of your community and adjoining territory. Have the letter read something like this:

der on you one or a hundred dollars' worth of supplies as a gift. Be prepared to supply orders for this purpose that are in themselves attractively Christmassy.

A woman does not want to present a merchandise order that is nothing more than a little writing on a plain slip of paper. Have some gorgeous holly cards with envelopes to match. The easiest way to get these is to buy some regular greeting cards or folders and typewrite the orders on them.

You have good windows and a good many people pass by them, and not a few stop in front while getting gasoline. You ought to trim up those

Ourtown, Ill., December 6, 1920.

Dear Madam:

You want to please some man with a Christmas present.

Is there any way a man with a car can be better pleased than by giving him something for that car?

Any man who is mechanical in his tastes—any man who ever motors—knows of things he would like for use in connection with driving or working about a car. It may be only a new and handy type of wrench, or some other special tool that did not come with the car. It may be a trouble lamp and cord; it may be a handy flashlight, a new type of pump or jack, or a pocket tire gage. Talk to any man about his car and you will hear him say he wishes he had this or that for it.

We have provided ourselves with a supply of Christmas boxes and wrapping paper and we have blank greetings cards, so we can fix up your purchase in our line to look as Christmassy as you wish

If you want to make your gift strictly utilitarian, why not give an order for a certain amount of supplies, an order the recipient can trade out with us for anything he wants, from gasoline to tires?

Of course, we will be glad to make delivery anywhere in town at any time for Christmas and we will be glad to deliver anything from a gallon of gasoline to a new sedan.

Just step into our office and ask us about anything you have in mind for Christmas use.

Yours very truly,

JACKSON'S GARAGE.

There are always people who like to give merchandise orders for their Christmas presents. Have cards suitable for that purpose and let them or

windows in some way that will give them a Christmassy look. You can make almost anything, even a pail of cup grease, look like a Christmas

present, if you tie a red ribbon and a sprig of evergreen on it.

Get a roll or two of red crepe paper and cut it into narrow sections to make paper ribbons. Cut it, when unfolded, just enough so your shears will go through it. Even new tires will look like presents if tied with red paper strips. If you have no knack at getting things up in this way, someone in the establishment may have, whether it is the stenographer or Friend Wife.

Perhaps your windows are not arranged for displays and you have no place to set goods. Then make a platform inside of them by laying boards across boxes and covering the boards with crepe paper. A great many people will stop and look in your windows if you have them trimmed in a holiday fashion.

If you have things where people can see them, together with a sign, "Auto Accessories for Christmas," you will put an idea into many minds that otherwise would not have lodged there. There are more people than you think who are ready and willing to buy your stock for Christmas presents, but they have to be reminded of the goods or they will not think of them.

You should take some space in the newspapers, too. Get space right close to that of the big holiday advertisers who are appealing to the women. Get next to department or dry goods store advertisements, if you can. In that space suggest automobile accessories as gifts for men.

If you make your advertisement appeal to the men, urge them to let their families know what they want in the accessory line for Christmas. They might just as well receive something they really want as to have some kind of a knickknack for which they have no use.

Every automobile owning man has some relative or friend who wants to get him something he will like for a present, but a woman often does not know what to choose. Show them that you can help them to select the right thing. Make up a newspaper advertisement like the one shown.

Don't forget to feature delivery, because women like to have things de-

livered, and if you make it plain that they will not have to carry their purchases home, you will make them the more inclined to buy. No woman, unless she comes in a car, will want to carry a pipe wrench, a tire pump or a jack, home with her.

You will have to make delivery of these purchases. So advertise this delivery service and assure the public that you will wrap purchases for shipment by mail or express, and deliver to the express company, or to the post office, if desired. Women do not have

better service than any mail-order house. You know the man for whom they want to buy, and you know his car, very likely.

Notice that the sample advertisement asks women to come in and shop just as they would in a store. Well! Women like to go into stores and look around and see if there is anything there they want, and then buy or not, as they please. It is different in your place. It isn't a store where they are going to come in and look around, so you will have to say a good deal in your advertising to make them feel free to come in and see what you have to offer.

Remind them that you know all about all kinds of cars and that you can help them to pick out what a man will want. Tell them, too, that you know what a good many men are thinking of getting. If a woman knows the man patronizes your garage, it will occur to her at once that you probably know what that man would like to have.

You see, women are anxious to buy Christmas presents that will be what their men want—but they cannot find out much from the men, so they don't know just what to buy. If you make it plain that you can help them to pick out presents that will be appreciated, you can interest the women. It is going to be worth while, anyway, to interest the women in your garage and to get better acquainted with them, because they are driving cars more and more themselves, and al-

ways the women of the family have influence in buying.

If you have never thought of Christmas as an occasion that means any additional business for you, see what you can do to make it pay. Perhaps you will discover that you have been missing a good bet.

#### American Automobiles Seen in the Streets of Turkish Cities.

American ambulances and motor cars are beginning to make their appearance on the streets of Constantinople. These cars are being used by the American Red Cross for transporting supplies to its warehouses.

### Best Present for a Man

What is the best present to give a man for Christmas?

The best present is something he wants.

Has he an automobile? If so, you may be sure he will be better pleased with something for that car than with almost anything else you might give him.

Perhaps he is a tool "fan" and crazy about good tools. Find out what tool he is wanting now and get it from us.

If his car lacks a spotlight, or a trouble lamp, get him one. Perhaps he wants a good flashlight to carry in the door pocket for use around the car at night. Has he a mirroroscope, a windshield cleaner, a pressure gage for the tires, a hydrometer for the battery? Is the jack or the pump old?

There is something that man wants for his car.

Why not come in and let us talk over some of the new and useful accessories—see them and get our prices.

Shop here just as you would in any store. Buy only if we show you something you want.

Jackson's Garage.

the conveniences for wrapping parcels for shipment, and unless they know you will do this, they will avoid buying your kind of goods for presents to send away.

No doubt a good many women are sending to catalog houses for just the things you sell in the way of accessories—because they do not know where to buy them. You must remember that many women who have no cars and know nothing about them, are likely to be purchasing gifts for people who do have them. Such buyers need your professional help in making selections. You can give them

It Is Never a Case of the Cheapest Car, the Cheapest Accessories, and Cheapest Service With Robertson and Bennett—The “Best” Is None Too Good for Their Customers—Their Policy Embodies System and Courtesy

Back in April, 1905, Frank Bennett and George Robertson hired a small barn 20 ft. by 40 ft. in size, located in the rear of the Eagle Hotel in Keene, N. H., secured the agency for the Stanley Steamer and started in the automobile business. They sold cars, made some repairs, and did a livery business with a four-passenger 1903 Stanley.

[illegible]

Ford agency to take the Stoddard-Dayton agency.

developed into a trucking business and the firm now keeps from four to five trucks busy all the time at the work of furniture moving.

| Name                       |                              | Job No.                      |          |
|----------------------------|------------------------------|------------------------------|----------|
| Model                      | Date                         |                              |          |
| MODEL & JOB NO.            |                              |                              |          |
| No. of<br>operations       | NAME OF EMPLOYEE             | START<br>TIME                |          |
|                            |                              | Stop                         | 1 - 4 21 |
|                            |                              | Start                        | 1 - 4 21 |
|                            |                              | Stop                         |          |
|                            |                              | Start                        |          |
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|                            |                              | Stop                         |          |
|                            |                              | Start                        |          |
| Average<br>Elapsed         | Total<br>Time                |                              |          |
| 1 Assembly .....           | 14 Fenders .....             | 27 Speedometer .....         |          |
| 2 Body .....               | 15 Floor & Rear Brakes ..... | 28 Springs .....             |          |
| 3 Brakes .....             | 16 Frame .....               | 29 Steering Components ..... |          |
| 4 Building Options .....   | 17 Front Axle .....          | 30 Tires .....               |          |
| 5 Carburetor .....         | 18 Car & Air Systems .....   | 31 Tuning Cams .....         |          |
| 6 Chassis Guides .....     | 19 Cooling Valves .....      | 32 Transmission .....        |          |
| 7 Clutch .....             | 20 Magneto .....             | 33 Universal Joints .....    |          |
| 8 Cooling System .....     | 21 Motor .....               | 34 Upholstering & Top .....  |          |
| 9 Drivetrain Cap .....     | 22 Oil & Grease .....        | 35 Wheels .....              |          |
| 10 Engine's Summer's ..... | 23 Race Aids .....           | 36 Wheelbase .....           |          |
| 11 Exhaust .....           | 24 Shifting Cars .....       | 37 Wash & Polish .....       |          |
| 12 Drive Shaft .....       | 25 Shop & Race Traps .....   | 38 .....                     |          |
| 13 Electrical System ..... | 26 Shop Work .....           | 39 .....                     |          |

Keene is a city of about 10,000 population, located where many tourist highways cross. The Keene Garage, as Robertson and Bennett call their establishment, is located in the center of the city and is able to secure a great deal of transient trade in repairs and gasoline, oil, and other supplies.

## ROBERTSON & BENNETT

|                 |             |
|-----------------|-------------|
|                 | 19          |
| Truck No.       | Miles       |
| Weather         |             |
| Town of         |             |
| Gals. Gas. from |             |
| Quarts Oil      |             |
| Class of Work   | Hrs.        |
| Loads A. M.     | Loads P. M. |
| Length of Haul  | Miles       |
| Lost Time       |             |
| Hrs.            | Cause       |
| Care of Truck   |             |
|                 |             |
| Foreman         |             |
| Driver          |             |

A well-equipped battery department is maintained and a goodly stock of

parts are ordered by telephone from Boston, 92 miles away and hurried through by express. This means that delivery of special parts, carried in stock by any concern in Boston, can usually be made the day following the order.

To make certain, however, that these special orders are watched and that the parts when they arrive are not placed in the stockroom and forgotten, a special order form is used. These are made in duplicate, the copy going to the customer and the original used to follow up the part.

Upon this form is written the name of the salesman, the date, the name of the car for which the part is ordered, the year the car was made, the model and the car number. Below this information is written the name, number and other necessary data about

copy as can be seen serves as a receipt for the customer.

The office voucher is used to follow up the stockroom and make certain that the part is delivered to the

#### Special Parts Orders Are Well Cared For.

customer as soon as it is ordered. The result is far better service to the customer than would be possible if the memory was relied upon.

The company keeps a perpetual inventory of all stock and carries on account of its wholesale business a very much larger stock of accessories and tires than is usually found in a city of the size in which it does business.

When the car owner brings in his car for repairs, except for very small jobs, he signs a written order for the repairs before work is started. To simplify the making out of these orders, there is listed on the front side of the card, 37 different items with spaces for two more, each being numbered and with sufficient space allowed at the right to make a brief notation. At the top of the front of the card is a space for the name of the car, the job number, the model and the date.

The time record is kept in connection with the time clock. When a workman starts work, he writes the number of the operation in the column at the left, his name to the right and stamps the time at the time clock. When that operation is completed, the time is again stamped at the time clock and the difference shows the exact time spent upon that part of the whole job. There is no possibility of making a mistake in setting down the time.

For storage and small jobs a tag with a detachable check is used. On this tag is listed: Storage, gasoline, oil, washing, polishing, sundries and labor, with space for other items and a column for itemizing the charges.

A card is also made out at the end of each day for each truck. If the truck comes into the garage at night, the card is turned in each day. If it is doing work that does not permit of its coming in at night, the cards are either mailed in or brought in as

soon as the truck returns to the garage.

On these cards the following information is given: Date, name of truck, the number of miles covered during the day, the kind of weather, the town in which the truck worked, the number of gallons of gasoline used and from whom secured, the number of quarts of oil used, the class of work done and the number of hours the trucks were used during the day, the number of loads hauled in the morning and the number of loads hauled in the afternoon, the length of the haul in miles, the time lost and the cause, the care of the truck, the name of the foreman and the name of the driver.

It can be seen that a very accurate record is kept of each truck. In fact, if profit is to be made on the trucks, it is necessary to have this accurate record. This record makes it possible to figure costs very closely and to know with certainty at just what prices the work can be done. There is also enough information to make sure that no loss will result due to any

The Time Card Permits of No Mistakes.

the part ordered, the amount of money deposited, and the name of the person who sends in the order to the manufacturer or jobber.

In other words, this form gives full and the most accurate information about the special parts ordered and the

Tag for Storage and Small Jobs.

errors on the part of the highway department in keeping records.

With so many lines of business and with these so diverse, it is more necessary to keep very accurate and detailed records. The trucking business

(Concluded on page 20.)



# Little Tire Tricks That Turn Dollars

Turning the Corner From Failure to Success Is the Result of Watching the Opportunities in Your Own Shop—Progressive Dealers are Displaying Some Initiative Worth Considering—Try the “Tricks” in Your Own Shop

By. F H. Sweet

We find them all over the country—in this shop and in that—not much, maybe, but the enterprise that turns the corner from stagnation or failure, to briskness and success. One shop just jogs along; its neighbor, everything else being equal, has an idea, utilizes it, and forges ahead. You know some of 'em. Watch a little closer and be inspired.

There is one dealer I know, who decided to do something. His vulcanizing and tire trade would bear stimulating.

He believed there was an opportunity right at home. So he walks up and down the alleyways in his district, peeping into the private garages and meeting the owners of cars when they are engaged in “cleaning and fixing her up.” He enters into conversation, raises the question of tires and usually gets a promise of a future trial repair order, or a job, to carry away with him. He carries samples of his rebuild and vulcanizing to show the quality of his work.

He has tripled his business in less than six months by going out after trade where trade is most likely to be found. The novelty of being solicited in the garage appeals to the car owners who are nearly always in the mood at such a time to discuss repairs and troubles. This particular vulcanizer always leaves his business card in each private garage he visits.

Another repairman has so arranged his shop that the people outside can look in and see him at work any time of the day.

Any mechanical art will attract a crowd to a show window. People are curious, and will look and give their attention whether drivers of cars or not, in this case. From a few to as many as 50 persons are often seen standing before this shop craning their necks to see what is going on. Many of them enter and ask questions about the process.

It has proved to be a good advertisement, according to the man who has tried it. Others might use the same method for getting trade.

A wide-awake vulcanizer in a near-

by town secured permission to place neatly-lettered cards in all the neighboring gasoline stations, directing motorists to his shop for tire bargains and repair work. He figured that when the gas customer is waiting for the tank to fill, he will have time to look at a brief announcement. Considerable new trade was traced to this form of advertising.

In order to have a little fun with the public and get crowds around his window, a certain vulcanizer joined

Keep tires properly inflated.  
Be sure to repad all tread cuts regularly.  
Prevent blowouts by avoiding severe jolts and by maintaining full air pressure.  
Have mud boils cleaned out and repaired at once.  
Be careful in applying tubes.  
Avoid sudden stops, quick starts, and skidding.  
Keep wheels in alignment.  
Use French talc in the casing—but avoid using too much.  
Avoid ruts and save the side walls.  
Keep out of car tracks.  
Apply chains properly (if they must be used).  
Avoid sharp obstructions.  
Remove grease, oil, and acids from your tires at once by using a cloth moistened in gasoline.  
Examine rims occasionally for irregularities and rust.  
Prevent damage from rust by using rim paint.  
Carry spare tubes in a bag.  
Keep spare tires covered.  
Be sure that nothing on the machine scrapes the tires as they revolve.

One Firm Built Up a Good Trade Based on Value of Advice to Customers.

two inner tubes together and patched them on the ends. This made one long tube, which, when inflated, looked like the body of a big snake. He then painted the tube to look like a snake and placed it in his window with appropriate surroundings. The effect was real!

To one end, he attached a concealed bicycle pump, by working which the “snake” was made to wiggle. Crowds outside enjoyed the fun—and business thrived as a result. The local news-

paper carried a story about the novel window display.

A window display showing the chief types of punctures and blowouts held public interest for ten days in an enterprising repairshop. Typical tires, which had suffered damage under ordinary usage, were placed well forward in the show window. A card on each tire with a chalk arrow indicating the hole or gash, as the case might be, explained the cause of the trouble. The interest of even people who were not car drivers was aroused.

Inspired by a series of advertisements showing the tracks of tire treads in the mud, a tire shop conceived the idea of holding a local contest. Photographs of four automobile tracks, left by four different brands of tires, were enlarged and placed in the window.

All of the four brands were represented in the line carried in his shop. Each photograph bore a number—from 1 to 4. To persons first guessing the correct brands represented by each tread, a new tire was given as a prize.

Appropriate placards in the window called attention to the service offered by the shop and its ability to “deliver the goods.” The crowd that gathered around the window was large.

Of course, it might seem at first sight that this guessing might be easy. But, the memory does not easily recall the tread design on individual brand tires where the trademark is not given thereon—and it took some scurrying around for the first entrants to get the right dope. The contest lasted two days and the first correct answer won the tire.

Another vulcanizer has adopted as a trade slogan the phrase: “We will not repair your tires for you unless they are worth it.”

This line appears on all bill heads, letter heads, on the signs and business cards, as well as in the newspaper advertising which is resorted to from time to time.

“We follow out this idea to the letter,” said the manager of this shop, “and the good results are evidenced by the fact that our business has doubled

in four months. Backed up by quality work and a policy of fair dealing, our place has secured patronage from all parts of the city."

One shop, carrying a line of tires, has built up a good trade on the value of its advice to customers. The appeal has been made by mail and by window display.

The idea is conveyed in all its dealings that the firm is in business to stay and is anxious to have satisfied customers. Recently a card was mailed to a list of customers, on which instructions were given as to tire care. The notice read:

"It is our desire that you get full benefit from the tires we sell you and that you are satisfied with the lasting qualities of our repairs.

"We give here some hints as to tire care, which, if followed by you, will give you greater mileage."

A woman with ideas has developed a system of her own for selling automobile tires. She thinks the most likely customer for new tires is the one who needs them on his machine. With this end in view, she is continually on the lookout for a car with wornout shoes.

When she finds one, she makes a note of the license, finds the address of the owner from the license bureau, and then sends a special delivery letter to him calling attention to the fact that his machine needs new tires. Later, she calls with section samples and prices, and manages to close a surprising number of sales.

These cases are presented merely to call attention to some of the things that enterprising, and therefore, progressive dealers are doing. There are unquestionably opportunities for business getting about your own shop and neighborhood. Rub your head a little and go to them.

### **Gasolene Supply Is Far From Being Exhausted.**

"The motor car will be kept running," says a Maibohm distributor.

"In the past year or so, there has been a growing fear on the part of many well wishers of the automotive industry that the gasolene supply was giving out; that its prodigal consumption by five million American automotive owners meant its early end.

"It is a popular fallacy, too, to believe that automotive power can come from oil wells only. But the war proved differently. When they couldn't get gasolene, the Canadians

distilled a war substitute from waste straw. The Greeks ran their motors on a liquid distilled from trees. In Sweden they made the motor go on fish oil. Even the Turks had a substitute—they moved their lorries on mustard oil, and the Germans used a gasolene substitute not known, but which had a sickly, sweetish odor.

"The oil wells in America haven't run dry yet. There are wells in the mountainous districts which have given up a healthy yield for hundreds of years. The Panuco wells in the Tampico district of Mexico apparently are inexhaustible. Oil still gushes from them in the same volumes it did originally.

"There are tremendous possibilities of new discoveries of wells in Canada, Alaska and Siberia; and

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*I grew convinced that truth, sincerity and integrity in dealings between man and man, were of the utmost importance to the felicity of life; and I formed written resolutions, which still remain in my journal book, to practice them ever while I lived.—Benjamin Franklin.*

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there are enormous supplies of shale in Wyoming and other western states which the government is holding. Benzol, too, opens up a big source of supply. It is cheap and easily obtainable, but has a dynamic kick to it. If it can be made a little more docile, and scientists are working to that end now, it will do its share to keep the motors running."

### **War Department Urges Construction National Highway System.**

In July, 1919, the great transcontinental army motor convoy started on its successful trail-blazing trip to the Pacific Coast. This expedition resulted in the establishment of the Lincoln Highway as a national motor truck road.

In its recent report to the highways' committee of Congress summarizing the conclusions reached as a result of the convoy, the War Department recommends the construction of a Federal system of national highways. The report is in part:

"First—That the necessity for a comprehensive system of national highways including transcontinental or through routes east and west, and north and south, is real and urgent, as a commercial asset to further colonize and develop the sparsely settled

sections of the country, and, finally as a defensive military necessity.

Second—That the existing roads and bridges, especially in the sparsely-settled sections of the Middle and far Western states, are absolutely incapable of meeting the present-day traffic requirements, and until modern types of roads and bridges are constructed, which will permit the rapid movement of heavy cargo vehicles during any season of the year and in all conditions of weather, economical transcontinental highway traffic will continue to be but a vain hope.

Third—That the road problems of the Middle and far Western states are national rather than local problems, as these states, while possessing vast area and tremendous mileage of highways, have only a sparse population which cannot possibly undertake the needed highway improvement work, which moreover is usually of greater importance to the country as a whole than to the individual states.

Fourth—That the radius of action, and resulting utility value of the motor vehicle, is limited only by the condition of the roads, and that the provision of adequate roads will have a far-reaching effect on the economic development of the country at large.

Fifth—That the types of motor vehicles, especially those used by the army, should be co-ordinated with the road conditions. In other words, until such time as all sections of the country are connected by improved highways that are passable to heavy motor vehicle traffic at all seasons of the year, the size and weight of vehicles should be limited to types of light and medium capacities."

### **Garagemen Consider Employing Women as Helpers.**

The New York City Garage Owners' Association is to hold a meeting in the near future to decide whether women helpers, cleaners and polishers should be substituted for men. One of the lessons taught by a recent strike, is that car owners are not satisfied with simply storing their cars, but demand at least a measure of service.

One reason advanced for employing women is that garage owners feel they will be more dependable and will not be subject to the whims of a walking delegate. Although the hours of work in garages are long and owners are considering working the women in shifts, many believe this can be done without material increase in expenses.

# Don't Watch the Clock—Step Lively

You'd Think Persy'd Bin Appointed Time Inspector—Hees A'lways Watching the Clock—I've Decided If Weed Be as Interested In the Boss Having His Bizness Grow Mebby Our Pay Would Get Bigger Faster—Ain't It the Truth?

By Frank Farrington

Deer Pete:

I got your postal card showing you and the boss standing out in frunt of the drug store. Gee, youd ought to be in Pike Citty in a garaje and then you woodent haf to spend your time standing around in the dore getting your foteygraf taken. The boss and you wood both hav sumthing else to do. Pretty soft in a drug store Ide say.

Dazies bin cuttin down the high cost of livving laityly and she brings her lunch with her insted of buying it and the other day she sent me out to get sum ice creem and she giv me sum and becaws the boss wassent there we was eeting it off his desk and he cum in from his trip and he stoppt in the dore and lookt and just when he began to ball me out—

Dazie sed, "Mister Hecker, Ime giving William a little ice creem to pay him for getting it for me. You see luncheons cost so much Ive got to bring mine from home. A poor working girl like me cant afford to go out and pay a dollar for a lunch and the docter says I must hav nur-rishing food," and then she gave a flop or two to her eyewinkers to see if she coodent sqweeze out a teer. That sob stuf was too much for me and I just sed "Excoose me" and I beet it.

The boss shut the offis dore and all I cood heer thru the keehole was, "O thank you mister Hecker. Youre so kind to me." But the next day I no-tist Dazie and the boss went to lunch together and they cum back looking good and nurrisht. Well I aint kickin if the boss wants to buy Dazies lunches. I spoze heel do it till he catches her sum day with that traveling drummers picture on her desk that she puts up there when the boss is out of town.

Speeking about going to lunch weev got one man that wood like to go to lunch every hour. Thats Persy. I owe him one and yesterdie I was going to get even. Heez always watching the clock. Youd think heed bin appointed time inspector except he never says a word when its fast, but if it gets a min-nit slow heez rite there with the key to set her rite. So when he was out yesterdie forenoon I set the clock ahed an hour. Persy got kind of careless

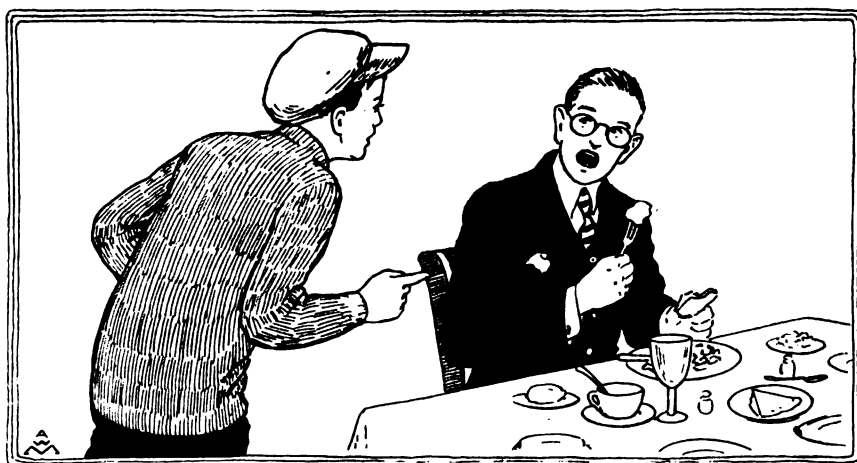
or sum such mixcher in frunt of him and about a dollers worth of side dishes around him and he wassent watching enny clock then. I sed, "Say Persy, the boss wants to know how you get that way, going to lunch an hour too soon and leeving me all alone in the offis." He pulled out his wach and lookt at it and he giv one jump and landed outside of the dore without even paying his check. I told the casheer it was all rite. Heed be back and I went back.

When I got to the offis the boss was telling it to Persy and he giv him a hole histery of what kind of a feller it is that dont care a hoot for the bizness, but is all the while watching the clock and thinking about how soon it will be time to go. Say I never thought so much about it be-fore, but thats rite. The feller whose all

the while wondering if it aint pretty near quittin time cant be giving very good attenshun to his job.

When the boss got thru with Persy I lit on him and sed the restaurant feller was going to hav him pinch for jumping his board bill. So Persy had an awful poor day and I dont figger Ime even with him at that.

The more I think about that clock bizness, the more I think a clock in a garaje is a dammij sumtimes. Why if Ime doing sumthing when it gets along towards closing up time I kno I dont work the same. I slow down and I begin to think I wont get much more dun ennyway and then I go and get reddy to leev sooze not to waste enny itme beeting it. And Ive seen that most of the fellers in the place dont take the same interest in a cus-tomer that cums along just before quitting time. Theyer all afrade theyll looz a littel of their preshus time and Ime that way too.



The Boss Wants to Know How You Get That Way, Eatin' an Hour Early.

about the time for a wunder and by and by he lookt at the clock and it was one when it ought to hav bin twelve by rites. Persy goes to lunch at one.

"My gosh!" he sed and he rusht for his hat and coat and he diddnt wate to see whether Bob was back yet or not. Only one of em is supposed to be away at the same time. Out he goze and there was noboddy left in the offis but me and by and by in walks the boss and he says "Wheres Persy?" I sed he was gone to lunch. The boss lookt at the clock, but by that time Ide set it back all rite.

"Do you kno where he eets?" he askt me. I sed I did.

"Then you russel around there and tell him mister Hecker asks him to look at his watch and see if heez gone crazie or meerly got up so lait he misst his brekfust."

Did I go Pete? Well you kno me. I found Persy with a big dish of slum

I was kidding a plumber the other day when he cum to the shop to mend sumthing and I says, "Did you begin to charge up time as soon as you left the shop?" And he cum rite back at me, "Do you get heer long enough before opening time to get your coat and hat hung up and your pompadore brusht out of your eyes and get to working by the time the clock strikes?" I new I diddent so I diddent say ennything more to him about that. I saw that if I take 5 minnits every time I cum and every time I go, theres mebbby 20 minnits or haf an hour every day that Ime doing like the plumber, getting reddy on the time of the boss.

I gess the size of the hole thing is just what Bob sed when I was talking to him about it. He sed "The trubbel with us is that we are thinking a good deel more about our own good times than we are about the sucksess of this garaje bizness. If weed be as interested in the boss havving his bizness grow and make more munny as we are in getting out of heer rite on the dot, the bizness wood grow faster and mebbby our pay wood get bigger faster." Aint that the truth Pete?

Ide bin thinking all the while I wasent afrade to work but I see Ive bin afrade Ide work overtime when I wanted to get at sumthing else. And I gess if I saw the boss was as afrade of paying me a cent too much every Saterdie nite as I am sumtimes of working a minnit too long for him Ide think he was a skintflint and then sum. Bob and I are going to reform but I dont buleve ennything wood ever reform Persy or Dazie eether. Well no more tonite from

Yours

Bizzy Bill.

### **SATISFIED CUSTOMERS— QUALITY SERVICE.**

(Concluded from page 16.)

is one that is not closely connected with the garage work, the sale of cars is also a line in itself as is the accessory business, especially the whole-sale part and the battery service. Unless accurate records were kept and each department carefully watched, it would not be long before some serious losses would be likely to develop at some point.

All this data that is gathered at this source, is turned into the bookkeeping department which keeps the main records and ascertains just how much each department is making. Robertson and Bennett, like other successful

automobile dealers and garagemen, give close attention to the bookkeeping end. They do this because they have found that this is the only way in which profits can be assured and that, as the business grows in size, it will grow as well in prosperity.

In addition to the selling that is done by both Mr. Bennett and Mr.

### **Business Success.**

"There are three ways of doing business.

"The first is to make and sell the cheapest article on the market regardless of quality. This is a poor and unstable sort of business that can never grow very large, for your customers will not return to buy a second time unless they can find no goods elsewhere, and in any event, they will hardly be people of sound financial ability.

"The second way of doing business is to make the finest article possible regardless of price and sell only to those 'ultra' people who have the price. This is almost a luxury market and is not big enough to permit the economies in manufacture which come from volume production.

"The third way, and the one that we can in the very beginning, is the way to make the very finest article that can be sold at a price which the mass of people can pay, pressing for volume production to raise the quality to a point where it will equal the quality which might be obtained under 'ultra' quality production."—System.

Robertson, and the accessory salesman, newspaper advertising is used as well as moving picture slides and road signs. The concern is constantly kept before the attention of automobilists and special attention is given to quality of service.

The oil, gasolene and everything else that is handled, has been selected because there is reason to believe that it will give a little better satisfaction in that territory than some other kind would. It is not a case of the cheapest, but rather of the quality which will give better satisfaction.

The writer remembers riding with a car owner who went to this garage and paid a little more for his gasolene than he would have paid at some other garage for a different grade, simply because he felt certain that Robertson and Bennett knew the right kind of gasolene to use to get the best results from a car on those New Hampshire hills.

It is an interesting fact, also, that

the decision to give up the Ford agency and handle the Stoddard-Dayton car was made because at that time it was thought that the Stoddard-Dayton car gave the people better value than the Ford. One is inclined to forget that there was a time when the Ford car was not as firmly established as it is now and that some cars which have now ceased to exist promised fine futures. The Robertson & Bennett Co. has outlived some of the makes of cars that it has sold, but it has not ceased to grow and to give the best possible service to the public.

### **Saskatchewan Has as Many Automobiles Per Person as U. S.**

Saskatchewan can now boast that it has as many automobiles per person as the United States.

The number of automobile licenses issued in the province from the first of the year to September 1, 1920, was 59,009. This is one automobile to every 14 inhabitants, "and that is the number of persons," said a government official, "who would have to ride in each automobile in the United States, if the entire nation started out duck shooting on the same morning."

Saskatchewan is considerably ahead of Canada as a whole, and the other principal countries of the world, as shown by the following statement of the number of persons to each automobile in each country: Canada 21, Cuba 91, Great Britain 180, Austria, 185, France 198, Switzerland 262, Sweden 550, Belgium 625, Germany 866, Mexico 969, Italy 985, Spain, 1,380, Russia 12,000, Japan 15,000.

Assuming that the average value of the cars is \$1,000, Saskatchewan's investment in automobiles is \$60,000,000. Of the machines in the province, 87 per cent are owned by farmers.

### **"A Horse and Buggy! What's the World Coming To?"**

To show the extent to which automobiles have supplanted horses on the streets of Wichita, Kans., it is related that little "Billie" Rutheledge, four-year old daughter of one of the Wichita citizens had never seen a horse and buggy until recently.

She had seen horses and, in a few instances, teams of horses pulling large wagons, but a horse drawing a single buggy was a new sight. "Daddy," she said as the conveyance passed down the street, "what is that thing fastened to that horse."



# Injuries in Course of Employment

An Employer's Duty Is to Provide for Employees Facilities for Necessary Comforts Demanded By Nature—If Workmen Leaving Their Place of Work to Go to a Toilet Are Accidentally Injured, They Can Obtain Compensation

By Chesla C. Sherlock

Any injury that is due to the employment, that arises out of hazards or risks deemed peculiarly incident to that employment, are compensable under the workmen's compensation acts, which makes the employer the party primarily liable for these injuries.

It is essential that the risk arise out of the employment and that the accident springing from that risk must come in the course of such employment. The employer's liability under the law cannot extend one jot farther than that limitation as laid down by the statutes and as interpreted by the courts.

In the previous discussion, where we considered the liability of the employer for injuries received while the workman was going to or coming from work, or while upon the public highways and away from the employer's place of business, we found that the employer could be liable in such cases only when the nature of the employment itself peculiarly increased the normal street hazard common to the community. Unless the accident can be traced clearly to the fact that the employment had made it more dangerous for the workman to be on the streets at the particular time, can the employer be held for compensation?

Another question, which is very close to the question of street hazards is the question of whether the employer is liable for injuries received by workmen when they have left their place of work and are on their way to the toilet.

It has been pointed out that the acts provide that the employer can be liable only for those injuries "arising out of and in the course of" the employment. When cases of this kind first came to the attention of the courts and commissions, employers contended that they were not liable for compensation for the reason that the workman had left his place of work, and that when he left his work in answer to a call of nature, he was then susceptible to risks common to everyone.

Take the case of a workman who falls downstairs and sustains a broken

leg while on his way to the toilet. Suppose that the accident occurred in a garage and that his particular employment was that of a shop repairman. When he started downstairs, he had stepped out of the risks of that employment and was then acting in an ordinary capacity just as every person does. Going to the toilet then, according to the employers, was an everyday act and if there was any risk connected with it, it was a risk of the commonality, just as that of going down the street to work was a risk of the commonality.

This view gained some headway during the early days of the compen-

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And now I must repeat one thing, namely, that the first use of education is to enable us to consult with the wisest and the greatest men on all points of earnest difficulty, that to use books rightly is to go to them for help; to appeal to them when our own knowledge and power fail; to be led by them into wider sight, purer conception than our own, and to receive from them the united sentence of the judges and councils of all time, against our solitary and unstable opinions.—John Ruskin.

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sation acts until a case arose which clearly pointed out that the theory was erroneous. In this case, it appeared that the employer had failed to provide toilet facilities for his employees and they were forced to cross the street from his place of business and use the toilet of another establishment.

One of the workmen, while crossing the street, was run down and killed by an automobile. It was shown that the employer had full knowledge of the fact that his employees had been going across the street, but that he had not taken any steps to remedy the situation.

He promptly resisted the claim of the dependents of the deceased for compensation, contending that answering a call of nature was a personal or individual matter and that when an employe left his work to do that, he assumed all the risks attendant upon

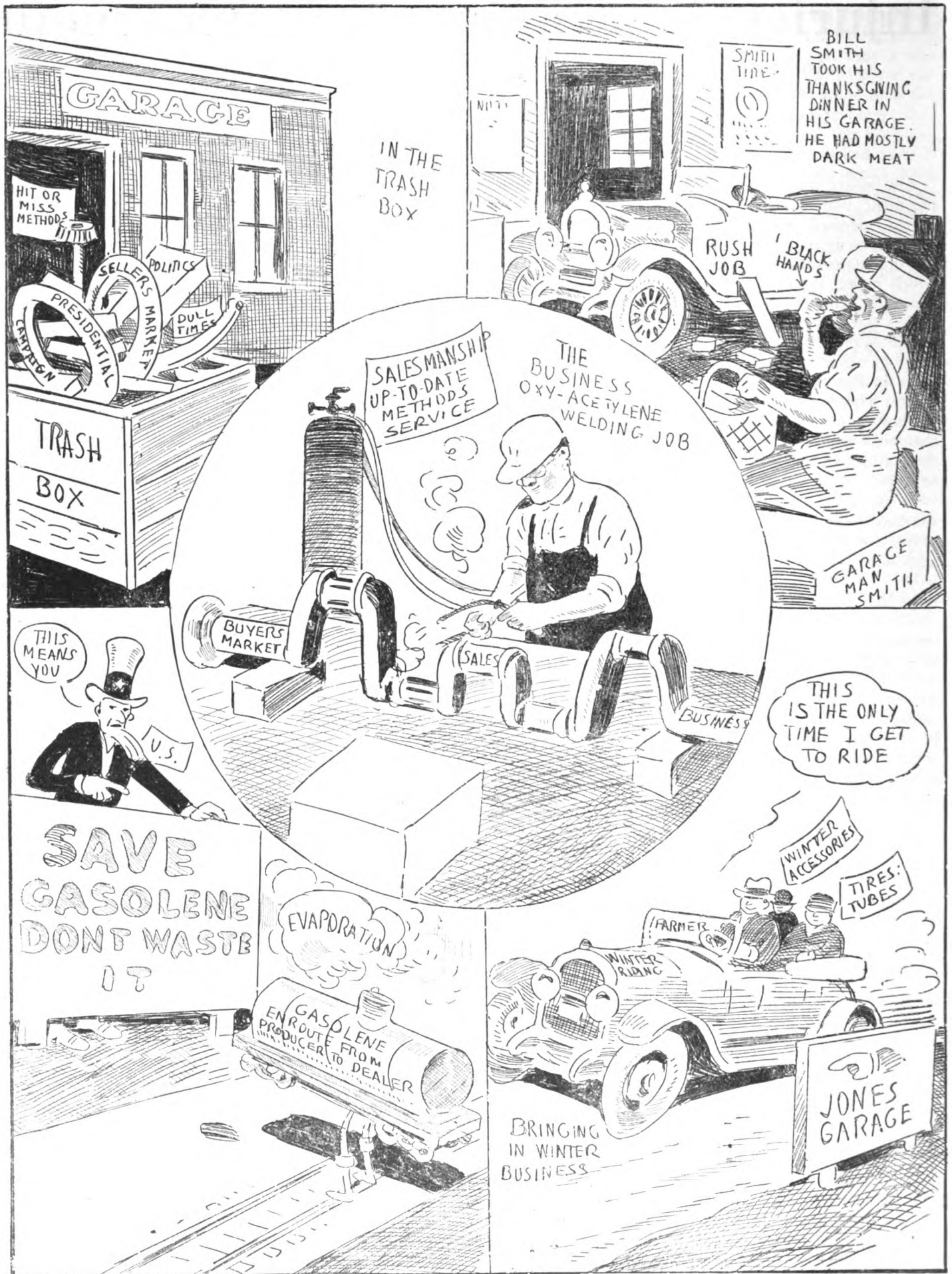
his action. The employer, therefore, should not be held liable for such risks—they didn't arise out of the employment.

The court, however, could not be prevailed upon to take this narrow view of the matter, in the light of the facts thus presented. And it said that the very first duty of employers was not only to provide a safe place in which to work, even under the workmen's compensation acts because it was to their interests to do so, but that the employer should also be bound to provide those facilities and conveniences which might reasonably be expected to add to the comfort of the employees. To provide the necessary comforts demanded by our nature, was an aid to better service for the employers.

Since the employer mentioned had failed to provide a toilet, he, in the estimation of the court, should be held responsible for the payment of compensation to the dependents. The employment had clearly increased the hazard by making it necessary for the workmen to cross the street in order to answer a call of nature.

And from this case has come an entire modification in the earlier ideas on the subject. It is now uniformly held that the employer must be liable for compensation for injuries received while workmen are reasonably away from their particular place of work. If a workman goes to the toilet, a thing he reasonably has the right to do, and is injured through no desire or attempt on his part to wilfully injure himself, then the accident causing the injury is deemed to be one "arising out of and in the course of" the employment within the meaning of the law.

Employers must ever keep in mind the fact that the compensation acts are to be administered in "a spirit of true helpfulness" and that any other construction upon this particular point would serve no useful purpose and only create loopholes through which, by weight of precedent, employers might eventually defeat the whole purpose of the acts.



# Unprofitable Business Partnership

Bryner and Carson Went into Partnership and Drew Up Their Own Agreement  
—One Day Bryner Asked to Have the Partnership Dissolved—He Found Many  
Discrepancies in the Contract—Don't Be Your Own Lawyer—It Doesn't Pay

By Harry Botsford

The other day the owner of one-half of a prosperous (to all appearances) and busy garage in a certain state, called at his lawyer's office seeking advice on ways and means of riding himself of his business partner. It seems the partnership had not worked out quite as smoothly and profitably as it had been planned. From all evidence it appeared that the partner seeking dissolution of the pact was entirely justified in his earnest desire.

To ease the work of narration, we will call these two men who jointly owned the garage, Ferris Bryner and Hugh Carson—which happens not to be their real names. Here is a thumbnail sketch of the circumstances which lead up to the partnership.

Bryner owned and managed the Everready Garage in a certain small city. The garage was not large as compared with some garages, but it was the most dependable in the city in point of service rendered to automobile and truck owners. Bryner was a good mechanic, a fair salesman, a good fellow to meet and an exceptionally hard worker.

He had built up a very profitable business and Hugh Carson had been working for him for three years as general bookkeeper and all-around assistant in the garage. To this time Carson had proved himself a hard worker and an efficient and dependable employe. True, Carson's judgment was not of the best, but this was always held in close check by the better balanced judgment of Bryner. In fact, to tell the truth of the matter, Hugh Carson was—and still is—one of those chaps who make excellent employes, providing they have executives over them who do most of the planning and directing.

In the winter of 1918, Bryner was taken seriously ill and confined to his bed for three months. At the end of that time, his physical condition was such that his physician strongly advised that he should not do any further work for three months more. The doctor's mandate was absolute. If Bryner failed to rest for three

months, the chances were that he would not live a year; otherwise he would regain his health in full.

During Bryner's illness, Carson had taken charge of the business and had carried it along with considerable success. He had, in all cases, acceded to Bryner's judgment as it had often been expressed prior to his illness. Being an employe, he had carried the business along the lines which he knew would please his employer. Consequently, the business prospered.

This is the condition of affairs at the time that Bryner had been informed by his doctor that if he wished to live, he should plan on taking a three-months' rest. The very same day that the doctor told this to Bryner, Hugh Carson called and told him that he had been offered an excellent position in the city and that he intended taking it.

The news came as a blow to Bryner. He did not believe he could afford to pay higher wages than he had been paying Carson. He must take that rest, even if he had to sacrifice his entire business. Life was something! Carson had always been an efficient cog in the little garage, too. Then Carson apparently solved the problem that Bryner had been trying to solve.

"Why not sell me half of the business?" he suggested. "I have some money saved and I will be able to pay cash if we can get together on a fair price for the business."

Six months later Ferris Bryner called on his lawyer and nervously and earnestly asked if there was not some way in which the partnership could be legally dissolved. Something must have happened!

"Let me see your partnership agreement," requested the attorney, after Bryner had finished his tale of how Carson had taken the initiative in buying goods that would never sell, in signing contracts for a line of tractors notoriously poor, and in signing checks that put a serious crimp in the firm's bankroll.

"Was this document drawn up by a lawyer?" the attorney asked after a

short examination of the agreement.

Bryner explained that the partnership agreement had not been drawn up by a lawyer, but that he and Carson had made it out on that memorable night when the deal went through. It had seemed all right then, he said.

The document was very brief. It merely provided that Carson purchased one-half of the Everready Garage for a specified sum, receipt of which was acknowledged, and that Carson from that date was entitled to one-half of the firm's profits. After a careful reading of the document, the lawyer began talking to Bryner and his words seemed to bury themselves in Bryner's soul.

"What I'm going to tell you, Mr. Bryner," he said, "is not going to be in the least bit pleasant! In the first place, you are a victim of your own lack of skill as a lawyer. I suppose it will be uselessly hurting your feelings to remind you of the fact that the man who acts as his own lawyer, has a fool for a client. Naturally, this agreement has a large number of serious defects and omissions in it.

"You are wondering, probably, how it happened that Carson, once a valuable employe, is now a poor partner. You would be surprised at how often this very thing happens and how often a lawyer hears similar tales. As an employe, Carson never had to use his initiative. His opinions and actions were governed by your well-balanced judgment. He had no opportunity to really show the kind of stuff that was in him.

"He had a capacity for work, under your direction and planning, but when he had to do the planning and directing himself, he just blew up. Given authority, he abused it because he did not know how to do things! Naturally stubborn, he insists now that he is right where he would never think of questioning your judgment, if he were your employe. As I say, this condition is natural. Because a man is a good employe, is no sign that he will make a good partner.

"Now as to this paper. In the first

place, why did you dispose of one-half of the garage business? By selling this portion of your business, you divided equally the power to govern the affairs of the garage and, according to this division, in case of a difference of opinion, the resulting deadlock is unpleasant to say the least. Your partner says 'yes' on some matter and you will say 'no.' The reverse is equally true. Each of you goes arbitrarily ahead along the lines you think best and the result is business anarchy that is both unpleasant and unprofitable.

"If you had sold Carson one-third of the business, I believe he would have been satisfied. The balance of power would then have remained in your hands where it belonged, and you wouldn't be here today asking for a dissolution. Or, if you felt that you should sell him one-half of the business, it would have been advisable to have made suitable and binding arrangements in this agreement as to each partner's duties, drawing account and salary, and a clause should have been added stating that neither partner could draw money from the bank or buy or sell goods without the other's consent and signature.

"Bryner, there isn't a single word in this contract about either partner's duties! Do you know what that means? Under the present agreement, Carson could sit around the garage and do nothing and take one-half of the profits while you did the work or let the business go to pot. And you could, likewise, do the very same thing, if you felt so disposed. Another thing, supposing the year's business showed a loss instead of a profit? You would be unable to make Carson share this loss as the agreement only mentions profits, as far as he is concerned. Bad business!

"Another thing you failed to take into consideration, is the fact that this agreement will run on perpetually. There is no date of termination. As a rule a partnership is more or less of an experiment and the agreement usually runs for one year, renewal being dependent upon the mutual consent of both parties concerned.

"Sometimes these agreements are renewed yearly for several years before a perpetual agreement is signed and then both parties are sure the experimental stage is over. While there is no date of termination to this agreement and while such omission is a great error, the omission marks

the only possible chance you have for making a legal dissolution.

"Some courts hold that where there is no time limit mentioned in the agreement, either partner can dissolve the agreement. But it's a toss-up, whether this will work or not in your case. Court's seldom agree on this point, but it is your only chance. Do you want me to try this? I'll tell you now that it will cost you some money."

Bryner had no choice in the matter, so he urged the lawyer to go ahead. The attorney brought the case to court where the whole proceedings were fought bitterly by Carson who remained stubborn to the end. Fortunately, the judge and jury were amenable to reason and precedent and the case was eventually decided in favor of Ferris Bryner and a dissolution ordered to take effect at once.

After the whole thing was over, Bryner began to check up the cost of the whole deal. The total was astounding, to say the least. Under the court decision, Bryner was forced to buy Carson's share of the business at cost inventory of the garage and contents. This included much of the goods which had been ordered by Carson and included two impractical and returned tractors that had cost over \$2,000.

However, Bryner was forced to purchase these undesirable goods and in order to raise the money, he had to make a loan at his bank.

He found that business had fallen off during his absence and after his return three months before. The lawsuit had not done the business any particular good.

Business is slowly and surely coming back to the Everready Garage, but it will be a long, long time before it will be as good as it was before the unfortunate partnership pact was signed.

It's going to take Ferris Bryner several years to get on his feet again. He'll make it, of course, but it will be a hard drag. It will mean work of hand and head and long hours. But he'll make it.

Ferris Bryner is sure of one thing: The garage sign will always remain supplemented:

"Ferris Bryner, Sole Owner."

No more partnerships for Ferris Bryner!

He will never again act as his own lawyer, for he has found that it doesn't pay.

## Opening for Sturdy Chauffeurs in Albanian Relief Work.

Wanted: Skilled chauffeur to run a locomotive. Must have had experience in road construction, railroad building, repairing freight trains, etc., and be willing to rough it. Preference will be given to mild-tempered young man carrying accident insurance. Apply ready for work at the headquarters of the American Red Cross, Tirana.

Advertisements like this may soon be appearing in Albanian newspapers, as a result of the turning over by the Albanian authorities of the railroad control in that country to the American Red Cross.

Gasolene power was the only remedy for the anemic transportation system already trembling on the verge of complete collapse. Austrian invaders had carried off all the steam engines, destroyed most of the rolling stock and so paralyzed the channels of trade that coal was absolutely inaccessible.

The only immediate solution to the problem of conveying supplies from one end of the mountain country to the other was that already in practice by the American Red Cross—the automobile truck. So a delegation called upon the representative of that organization in Tirana and appealed for its co-operation in keeping the narrow-gage line, linking Tirana to Durazzo, open. The Red Cross responded by taking the engines from several motor trucks to accommodate the new motor power, and now the Albanian trains rattle right along, up hill and down dale, carrying the sorely-needed food, clothing and hospital supplies to the destitute and diseased.

Only a highly expert chauffeur is competent to negotiate the difficulties of this, the dizziest narrow-gage road on the map. In addition to piloting his racing car, he must be ready at all times to hop off and repair the road bed, coax along his groaning train of trucks, and render such other first aid as the exigencies of his weird equipment and the rough going may necessitate.

## Portable Camping Palace Built by Los Angeles Man.

A Los Angeles man has just completed a bungalow on wheels for travel across country. The portable heavy wheels. In the rear of the house which has been built wide enough to accommodate it, is a bed which swings up against the back wall when not in use. Running water is supplied from two tanks.



# Motor Truck in Marketing Livestock

Farmers of Middle West Find Motor Truck Indispensable in Marketing Live Stock—Less Time Required, Stock in Better Condition—Greater Financial Returns—Truck Real Solution of Short Haul Problem—Opinions of Experts

By H. T. Dobbins

Middle Western farmers are finding the motor truck an indispensable adjunct to the prompt marketing of livestock. While the use of the truck is by no means confined to this department of marketing farm products, it is perhaps the most general and distinctive employment of this modern means of transportation.

There are four great livestock markets in the Missouri valley. These are located in close proximity to Sioux City, Omaha, St. Joseph, and Kansas City, and they form the marketing place for a great section of the country unsurpassed in the production of hogs and cattle. Success or failure in the growing of animals for foodstuffs depends largely upon two factors, the promptness with which they can be gotten to market in order that advantage may be taken of favorable breaks in prices, and the condition in which they reach those markets.

In the effort to perfect service on the railroads and at the yards, in order that these two factors might be conserved, a great deal of time and effort has been put forth by the producers, as is evidenced by the legislation upon the statute books of the states covered. To the livestock growers within 100 miles of these markets, the motor truck has proved to be the greatest invention of the age.

With the vast improvement in the roads, upon which these states are spending within the next two years between 30 and 40 millions of dollars, a very large percentage of the receipts at these stockyards, within a large area, will be represented by truck deliveries. This is shown by the fact that the truck traffic in stock delivery is in almost exact ratio to the state and condition of the roads.

Conditions at the great livestock markets are so similar

that it would be vain repetition to give figures for all of them, but here is what E. M. Carroll, traffic manager of the yards at St. Joseph recently said:

"Motor trucks are being used here to an increasingly large extent. We have had truckloads in here from as far east as Chillicothe, Mo., 85 miles from here by rail. We have also received livestock by truck from across the Iowa line, a distance of from 70 to 80 miles. There are trucks making regular trips to the market from points as far away as 60 and 70 miles. These trucks not only haul hogs, but they bring in cattle, calves and sheep, and very frequently they bring in mixed loads, separated by partitions.

"Our largest day's receipts from this source have been slightly in excess of 1,400 hogs, nearly 200 head of cattle and calves, and 200 head of sheep. We did not count the vehicles employed in carrying these animals, but we estimated that there were about 250, of which 75 per cent were motor trucks.

"Most of the trucks employed in bringing livestock to this market are engaged in the business regularly, and they range from

small trailers attached to the rear end of passenger automobiles to four and five-ton trucks. These large trucks have a capacity of as much as one-third of a regular railroad stock car. Many of them are able to get return loads, especially those that come from or pass through inland towns or towns not located on railroads.

"Some of these trucks are owned and operated by regular dealers located in the country, but the majority of them are simply engaged in transporting livestock and make a charge of so much a head or load. We believe that this movement is permanent and will vastly increase, and we are planning to increase our facilities for handling it."

State and federal marketing agents agree that the greatest usefulness of the truck on the farm is its ability to meet this demand for a short haul in taking stock to markets. It is not necessary to gather up a carload at some fixed time and hope that the railroad will be able to set a car on the day promised. In this respect, the flexibility of use of the truck is believed to make certain that with the development of the good roads system, it will become al-

most universally employed for this short haul. In the grain belt the number of farmers who are able to ship a carload at a time is limited, and small shipments cannot be as profitably made by rail as by truck. With the latter, the grower may meet the crest of the top price; his stuff is put on the market when it is most needed and when it will get the best returns.

This use of the truck is destined to put one individual out of business in those towns within 100 miles of the primary markets. That is the local stock-buyer. A Saunders county farmer was telling the other day of having sent two loads of hogs,



Specialty Fitted Trucks Haul the Hogs and Cattle to the South Omaha Market.

weighing a total of 4,200 pounds, by truck to South Omaha, at a cost of 50 cents a hundred pounds. They reached the yards with much less shrinkage than usual, and he was paid for them \$1.22 a hundred more than the local town buyer had offered him. They sold very quickly, because they looked better than the average hog on the market—and the price reflected this.

At Omaha one day's typical truck shipment showed 50 loads with an average tonnage of  $1\frac{1}{2}$  tons. The average distance traveled was 26.65 miles. It was found that the animals shipped in this way lost practically no weight, and the owners were able to get them to market within a few hours, getting the best prices of the opening. This was because the animals were loaded that same morning, were carried over comparatively smooth roads with much less jolting than the average stock shipment receives in the shifting of railroad cars, and by avoiding the heat or cold of the night were in prime condition.

At the St. Joseph market on one day's typical truck shipments, there were 91 truckloads averaging  $1\frac{1}{4}$  tons, and hauled an average distance of 25.94 miles.

At the Kansas City market, a typical day's shipment consisted of 52 truckloads, averaging a ton each and an average haul of 17.67 miles.

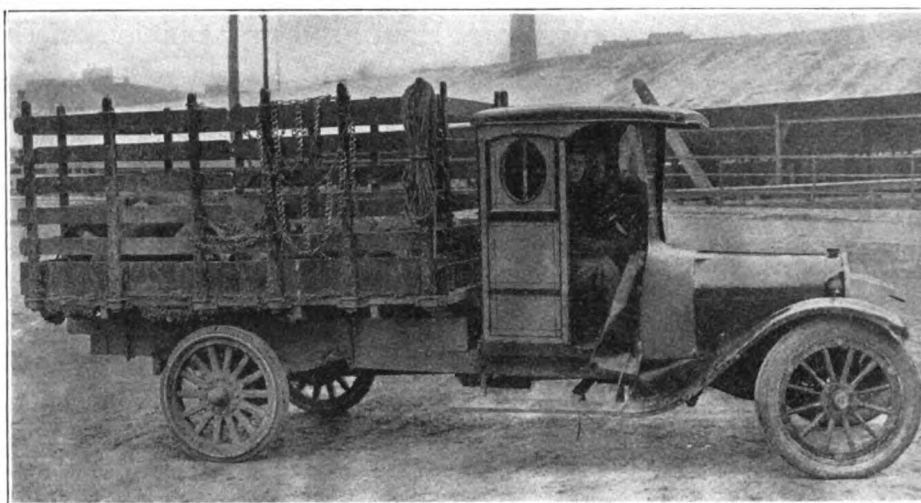
At Oklahoma City, there were 10 truckloads averaging  $1\frac{1}{4}$  tons, hauled an average of 22.40 miles.

John W. Wilkinson, who is an expert employed by Senator Capper, publisher of a number of farm papers, says that farmers everywhere have outgrown the old time tiresome and profitless method of transporting their products, and that what they desire and demand is a rapid transportation system that will eliminate the unsatisfactory railroad service incident to short hauls and the excessive travel of horse-drawn vehicles.

"The only thing that will meet this want," he says, "is the motor truck operated by the farmer himself or preferably by a man who makes hauling a regular business. The demand for motor trucks in the West is growing and will continue to grow."

Mr. Wilkinson says that men who have devoted their efforts entirely to hauling livestock are making big profits. In a number of instances they have regular lists of customers whose business they never fail to get, and that often they have so many calls for space that in good marketing

time they are dated up for days ahead. The profit in these lines comes from the back haul of furniture, machinery, groceries, feed and the various other articles in demand in small rural communities.



A Motor Truck With a Special Body for Transporting Livestock to Market.

The truck, in this short-haul business, has been a vast aid to the railroads. It has relieved them of a business that is not as profitable as the long hauls, and which ties up equipment about twice as long a time on the average as the longer hauls. The railroads are short on equipment as well as motive power, and they have not missed the revenue lost to the trucks. While the farmer pays much more for truck hauling than rail hauling, he is satisfied because of the better financial returns at the market, and this has removed a source of irritation between shippers and roads that has been a cause of bitterness in the past.

### Paris Uses Large, Powerful and Up-to-Date Motor Buses.

The automobile buses which, during the war disappeared entirely from the streets

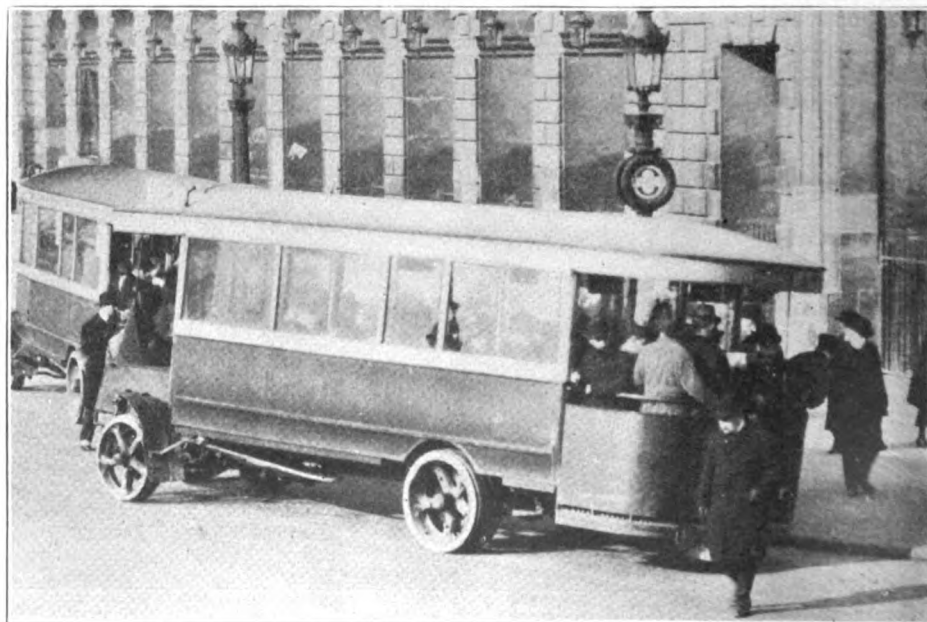
of Paris, having been sent, like their former passengers, to the front, are again back in service, and the farthestmost sections of the city are being gradually linked together by the addition of new lines of large and powerful buses.

These new buses, which have seats for 30 passengers with standing room on their broad rear platforms for about 12 more, are easy-going and comfortable. Well-lighted by large windows, they provide quick transportation, and at the same time offer a cheap and agreeable way for tourists to see the city. One of the novel features of these

new buses is the location of the exhaust pipe. Instead of running the length of the chassis to its end, as in all other cars, the motor exhausts into the air through a pipe projecting through the roof.

The wealthy ride a certain distance first class for 50 centimes—normally ten cents—while those economically inclined may cover the same distance for half that amount, the only difference being that if you ride first class, you have an upholstered seat. The rear platform is the only place for passengers to stand.

An arrangement which American lines might copy is the little pad of consecutively numbered leaves which is hung at all important stops. Each passenger tears off a leaf when he comes to the corner where the bus stops, and the conductor then admits the holders of these leaves in order. Join the Red Cross!



New and Powerful Buses Now Roll Along the Paris Streets and Boulevards.

# The Profitable Use of Taps and Dies

The Motoring Public Can Obtain Thoroughly Satisfactory Service Throughout the Country If Garagemen Will Include Taps and Dies in Their Shop Equipment—The Outlay is Not Great; the Investment is Well Worth While

By J. N. Bagley

It was a cold, frosty morning and the raw, north wind was bringing with it clouds laden with snow. Already large flakes were flitting here and there while the sky seemed to grow darker. We noticed that the old timers of the country stood about in small groups with their collars well up around their ears, to protect them from the raw, north wind that seemed to grow stronger as the minutes passed. We were yet many miles from home and, as the garage keeper came, we cranked up the old car and took the road down the valley to the south, in hopes that we would soon be out of the path of the storm. Always before, it had been our habit to go over the car carefully before starting in the morning, but owing to the weather conditions we neglected it this time.

When a few miles down the valley, my attention was drawn to a rattling sound which indicated a loose rod somewhere underneath the car. Upon investigation we found the brace rod supporting the run-

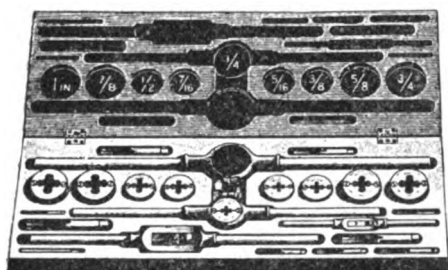


Fig. 1—Purchase of Combination Set Avoids Duplicating Parts.

ning board was broken close up to the support. Using a shoe lace, the rod was tied up and remained so until we arrived at the village, six miles farther down the valley.

I drove into a small garage on the corner to obtain a new rod, but was unable to get it because there was no dealer in town handling repairs for the car I was driving. Noticing that the rod extended well through the support on the other side, I asked the garageman to take the rod and extend the thread a little way on it. This could be done very nicely, for the locking nut on the opposite end could be backed off enough to allow the rod to reach through the support on the opposite side.

The garageman, however, did not have a die that would cut the thread (7/16 S. A. E.). I did not give the matter much thought, but made the temporary repair with a small wire and started for the next small town, which was seven miles to the southeast.

Arriving there, I tried to get the rod threaded, but again there was no die that would thread it. We stopped at five towns, ranging in size from 300 to 500 population, before finding a garage having a 7/16 S. A. E. die which could be used to thread the rod.

The fourth place I stopped I asked the owner why he did not add a set of dies to his equipment. He advised me that he did not have a great deal of use for them and said, besides that, they cost quite a little money. I mentioned a certain make of dies that would not be expensive and advised him to investigate. He declared that he would do that very thing and asked for the address of the manufacturer, but to save my life I could not tell where he was located.

Since that time the writer has given some time to investigation along this line and the findings are that there are many garages, especially in the smaller places, that do not have a tap and die set which will cut the most common threads in use.

Visits have been made to the shops where the boys have been overhauling motors and I have seen large numbers of bolts and capscrews, which had been thrown in boxes, that were perfectly good except each thread had been damaged and the nut could not be started. The result was the tap screw or bolt, whichever the case might be, was thrown aside and a new one used, providing a new one was at hand. I have also noticed that many times a size that did not fit was substituted for the original and in a short time vibration pushed it loose and the bolt would drop out.

Only a short time ago the writer had occasion to have a new spring shackle bolt placed and, upon returning to the shop for the car before the time stipulated, found the mechanic trying to start the nut with a hammer. He explained that in driving the bolt to place, he had damaged the thread to such an extent that the nut could not be started. I asked him why he did not remove it and use a die to straighten up the threads and he told me that he did not have a die which would fit it. I had him remove the bolt and was forced to visit three different shops before I found a die that would cut the desired thread on the bolt, which was a standard size.

It seems to me that if this condition prevails all over the country, there is an opportunity to sell taps and dies for some time to come, and unless the boys are persuaded to include them in their shop equip-

ment, the motoring public will continue to get anything but satisfactory service at the garages.

Many times a bolt or cap screw is required for a certain place and those in

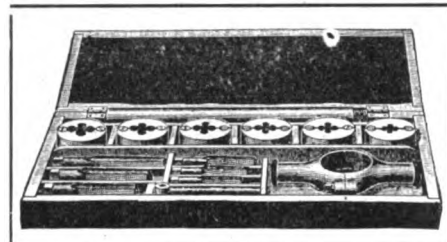


Fig. 2—As in Fig. 1, This Set Has Cutting Dies in Two Parts.

stock are either too short or too long. If a die is at hand, the necessary part can be made in a very short time. I have seen cars come from the shop, after overhauling, with cap screws or bolts an inch or so longer than they should be, with a nut under the regular nut to take up the balance of the bolt where the thread did not extend. Had the die been used, the thread could have been extended the necessary distance, the cap screwed off, and the job would have been handled in somewhat of a workmanlike manner.

The outlay for taps and dies for the average general repair shop will not amount to any great expenditure of cash, but, of course, the more complete the assortment, the more of an investment will be necessary.

The American Society of Mechanical Engineers has developed a form of U. S. standard thread known as the A. S. E., and the Society of Automotive Engineers has adopted it for the S. A. E. standard. In addition to this, the United States standard has been adopted by the United States government and practically all of the railroads and leading manufacturers of the country.

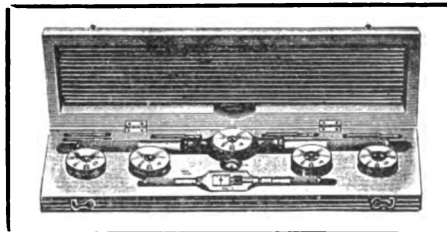


Fig. 3—Here the Die Slides into a Solid Frame.

In fact, it is the only recognized form of thread in the country and covers tap nuts and screws of all sizes.

The investment will not be quite so great if a combination set is purchased because it

avoids the duplication of stock, tap wrenches, and the like. Fig. 1 illustrates this sort of a set. This set, as well as that shown in Fig. 2, it will be noted, has the cutting dies made up in two parts, held

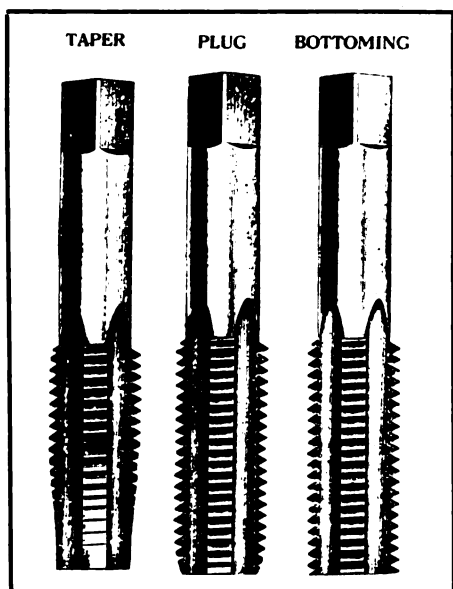


Fig. 4—Three Different Styles of Taps.

in position in the frame by small screws, while that shown in Fig. 3 has a die sliding into a solid frame, the adjustable feature being a screw that passes through the frame and bearing against the end of the cutting block.

A brace shank is also provided—in case one is required in the selection—and it comes in good play many times where the regular stock cannot be revolved for the want of necessary room. This bit brace shank is very handy for dressing up a thread about the car without removing the bolt, thereby saving considerable time.

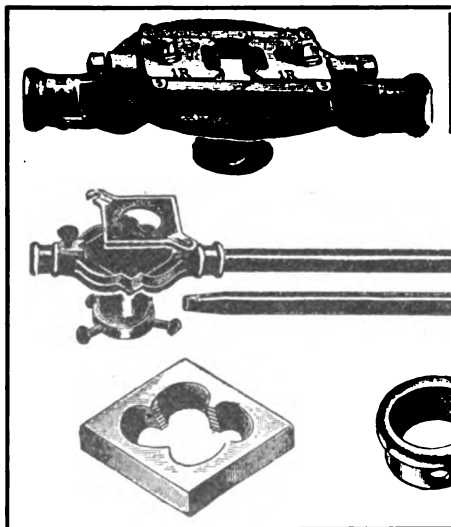


Fig. 5—If the Use of Pipe Dies is Necessary, Something as Shown Here Can Be Selected.

Shackle bolts, stud bolts, and the like come under this specification.

For an all-purpose die and tap assortment for repairing, the following 9 sizes are found to cover the field very nicely:

¼-inch 28 threads, 5/16-inch 24 threads, ¾-inch 24 threads, 7/16-inch 20 threads, ½-inch 20 threads, ¾-inch 18 threads, ¾-inch 16 threads, ¾-inch 14 threads, and 1-inch 14 threads. This will make a very good assortment for the average garage-man as these are the sizes that are most used by car manufacturers.

For repairing ordinary machinery, a set of nine sizes arranged in the following manner will meet the necessary requirements in nearly every case: ¼-inch 20 threads, 5/16-inch 18 threads, ¾-inch 16 threads, 7/16-inch 14 threads, ½-inch 13 threads, ¾-inch 11 threads, ¾-inch 10 threads, ¾-inch 9 threads, and 1-inch 8 threads. Aside from the foregoing, a small set of machine screw sizes will be found very valuable in making repairs about the electrical apparatus of the car.

As to taps, it might be mentioned that there are a number of different styles and types, but the taps referred to in this instance will be the regular plug as the bottoming tap cannot be started except it follows one or the other, preferably the plug. The three different taps are illustrated in Fig. 4.

If there is work that comes to the shop necessitating the use of pipe dies, something as shown in Fig. 5 can be selected for cutting the required sizes. For automobile and tractor repairing, the ½ to 1-inch will be found about the correct range of sizes. It will be noted that the first die stock shown in Fig. 5 has a movable, adjustable cutting die, allowing for either a tight or loose fit while the second one has a solid die. Both of these die stocks, however, have advantages in their favor and, before making the selection, one should size up the kind of work to be handled and take advantage of the type best adapted to the needs.

Among some of the special taps might be mentioned the nut tap, the long shank, tapper tap, pulley tap, horseshoe calk tap,

Many inexperienced users of taps break a great many because of the fact that they drill the holes too small for the taps. The cutting point of the tap bottoms in the solid metal and the tap is broken in nearly every instance.

The accompanying table gives the diameter of drills in thousandths of an inch for holes to be tapped. There is a certain allowance made above the actual bottom diameter size of the chosen thread, of from 0.15 of an inch for a ¼-inch tap, to 0.062 for a 2-inch tap, if for a V thread; and of 0.004 of an inch for ¼-inch tap, to 0.010 for a 2-inch tap for U. S. standard thread; with 0.019 of an inch for a No. 2 to .040 for a No. 30 screw pitch gage tap.

A common nut, drilled out so that it only contains 50 per cent of a full depth

| Size of Tap. | Threads to the Inch. | Root Diameter. | Inch Decimals. | Nearest Commercial Drill size to give 75 per cent depth of thread in the nut. |
|--------------|----------------------|----------------|----------------|-------------------------------------------------------------------------------|
| ¼            | 28                   | .2038          | .215           | 3                                                                             |
| 5/16         | 24                   | .2585          | .272           | 1                                                                             |
| ¾            | 24                   | .3210          | .334           | O                                                                             |
| 7/16         | 20                   | .3725          | .389           | W                                                                             |
| ½            | 20                   | .4350          | .451           | 29/64                                                                         |
| 9/16         | 18                   | .4903          | .508           | ½                                                                             |
| ¾            | 18                   | .5528          | .571           | 14.5 MM                                                                       |
| ¾            | 16                   | .6688          | .689           | 11/16                                                                         |
| ¾            | 14                   | .7822          | .805           | 13/16                                                                         |
| 1            | 14                   | .9072          | .930           | 15/16                                                                         |

Tap Drill Sizes for S. A. E. Standard Threads.

thread, will break the bolt before it will strip the thread. A 75 per cent depth thread gives an ample margin for safety (about 2 to 1) and eliminates the danger of breaking the tap in the operation. We might add, however, that a full-depth thread in a nut of the common kind is barely 5 per cent stronger than the 75 per cent depth thread, yet it requires almost

| Diameter of tap inches. | Number of threads to inch. | Drill for V thread. | Diameter of tap inches. | Drill for U. S. Standard thread. |
|-------------------------|----------------------------|---------------------|-------------------------|----------------------------------|
| ¼                       | 20, 24, 32                 | 3/16, 13/64, 13/64  | ¼                       | 3/16                             |
| 5/16                    | 18, 20, 24                 | ¼, ¼, 17/64         | 5/16                    | ¼                                |
| ¾                       | 14, 16, 18                 | 19/64, 19/64, 5/16  | ¾                       | 19/64                            |
| 7/16                    | 12, 14, 16                 | 11/32, 23/64, 23/64 | 7/16                    | 23/64                            |
| ½                       | 12, 13, 14                 | 13/32, 13/32, 27/64 | ½                       | 13/32                            |
| 9/16                    | 12, 14, 27                 | 15/32, 31/64, 33/64 | 9/16                    | 15/32                            |
| ¾                       | 10, 11, 12                 | 33/64, 33/64, 17/32 | ¾                       | 33/64                            |
| ¾                       | 10, 12, 20                 | ¾, 21/32, 11/16     | ¾                       | ¾                                |
| ¾                       | 9, 10, 12                  | 47/64, ¾, 25/32     | ¾                       | ¾                                |
| 1                       | 8, 12                      | 27/32, 29/32        | 1                       | 27/32                            |
| 1¼                      | 7, 12                      | 15/64, 15/32        | 1¼                      | 15/64                            |
| 1½                      | 6                          | 1 19/64             | 1½                      | 1 19/64                          |
| 1¾                      | 5                          | 1½                  | 1¾                      | 1½                               |
| 2                       | 4½                         | 1 23/32             | 2                       | 1 23/32                          |

Diameter of Drills in Thousandths of an Inch for Holes to Be Tapped.

stay-bolt tap, patch-bolt tap, and washout tap. Complete catalogs of these taps can be obtained from manufacturers which describe the entire line in a very complete manner.

three times the power to tap. Why then, should we run the risk of breaking the tap for the extra 5 per cent when 75 per cent will be sufficiently strong in every instance?



The size of twist drills to be used in boring holes to be reamed with pipe reamer, and threaded with pipe tap, will run as follows:

| Size in Inches. | Number of Threads to Inch. | Diameter Drill, Inches. |
|-----------------|----------------------------|-------------------------|
| $\frac{1}{8}$   | 27                         | $\frac{11}{32}$         |
| $\frac{1}{4}$   | 18                         | $\frac{29}{64}$         |
| $\frac{3}{8}$   | 18                         | $\frac{37}{64}$         |
| $\frac{1}{2}$   | 14                         | $\frac{23}{32}$         |
| $\frac{5}{8}$   | 14                         | $\frac{15}{16}$         |
| 1               | $11\frac{1}{2}$            | $\frac{111}{64}$        |
| $1\frac{1}{4}$  | $11\frac{1}{2}$            | $\frac{133}{64}$        |
| $1\frac{1}{2}$  | $11\frac{1}{2}$            | 1 $\frac{3}{4}$         |
| 2               | $11\frac{1}{2}$            | $\frac{27}{32}$         |

If the drilling is done in the manner prescribed, the breaking of taps will be reduced to a minimum and the tapping can be done with less effort, especially in case the taps are very large.

Combined pipe tap and drill can be had in the larger sizes when necessary for boiler work, and many times can be used to an advantage over the ordinary tap.

### It Always Pays to Present a Good Front to the Public.

What's the use of having a garage look as ugly as the proverbial livery stable? A "sloppy" looking building never fails to produce the impression that either the proprietor isn't prospering or else that he is too lazy and inefficient to keep his place looking snappy and up-to-date. Nobody is exactly yearning to do business with the proprietor of a "sloppy" garage, as the probability is that the job he does will also be "sloppy."

The small garage in West Philadelphia, conducted by William J. Smith, a photograph of which is shown on this page, because of its attractive exterior, stands out so that nobody can get by without giving it a good look.

Rustic window boxes, whose plants are changed according to season, adorn the neat, small-paned front windows. Immediately above the main entrance is a small model of a flying machine, built at the Philadelphia Navy Yard and presented to Mr. Smith by one of his customers, a naval officer who had charge of building the actual airplane.

These may be little points of interest, but they count heavily and Mr. Smith says he has had hundreds of motorists ask him about the flying machine, which is faithful to the real airplane in every particular. His women customers—and they are many—admire the window boxes, which, in the illustration, show geraniums and foliage plants. Sometimes there is a bench in front, close to the window boxes, for tourists to rest while repairs are being made on their

### Truing Up the Front Wheels.

By FRANK E. MORRIS.

"How much do I owe you?"

"Oh, 50 cents, I reckon."

I paid the amount cheerfully, jumped into my car, expressed my thanks, and drove on. The garage repairman hadn't given me value for my 50 cents in time or material, but he had saved my time, and some little annoyance. This was worth more than the amount to me. Had one dollar been the price of the job, I should not have considered him a profiteer, but nevertheless, viewed from his angle of the game, he was.

With human nature so easy to satisfy, and so willing to pay, it has struck me that the average garageman is not awake to his opportunities—opportunities, you might say, for picking up many an easy nickel, which added together make the muckle.

It has been my observation that many garagemen drive money away from their door, when by a little kindly advice, after a careful investigation, they could gather in enough halves and dollars to repay them for time that they ordinarily waste.

Take for instance the man who drives up to a tire dealer, whose make of tires he has on his car, and complains that the tires are prematurely worn. There is always a very good reason for this, unless it is defective material. If defective, the tire dealer immediately proposes an equitable adjustment, and attempts to send the customer away satisfied.

In many cases—yes more than 80 per

cent—tire—and the effects of the wear; its general condition. Upon finding a case of the nature of any of these, the tire man knows that it is not the fault of the tire. He also realizes that the average car owner, in such a predicament, must be handled with gloves, and a diplomatic explanation made to him, to cause him to believe that the car could be at fault. So the tire man proceeds to give the car owner a softened lecture.

In most cases he is able to convince the owner that he should have the machinery of his car regulated. The owner then drives to a garage. The garageman sometimes argues with the owner that the tire man is trying to evade an adjustment. Then you can imagine what the owner thinks when he returns to the tire dealer, who sticks to his original statement. He feels as if he were the victim of two crooks.

If the average garageman is not acquainted with the different symptoms in tire wear, he should acquaint himself with them. The tire itself will tell him what is wrong, and if he will throw a jack under the car, test the wheels, if bushings are worn loose, replace them, or if the bearings are loose, tighten them, then tell the owner what he owes, he will find that there will be no complaint, but a happiness on the part of the owner, who nine times out of ten is in a hurry. He is also glad to know that the trouble has been corrected, and will probably remember that garageman as one who knows his business, and is prompt to remedy trouble.

The garageman will also be on better terms with the tire dealer, who naturally being an expert in judging tires, hates to feel that he has been crossed in what he knows is right.

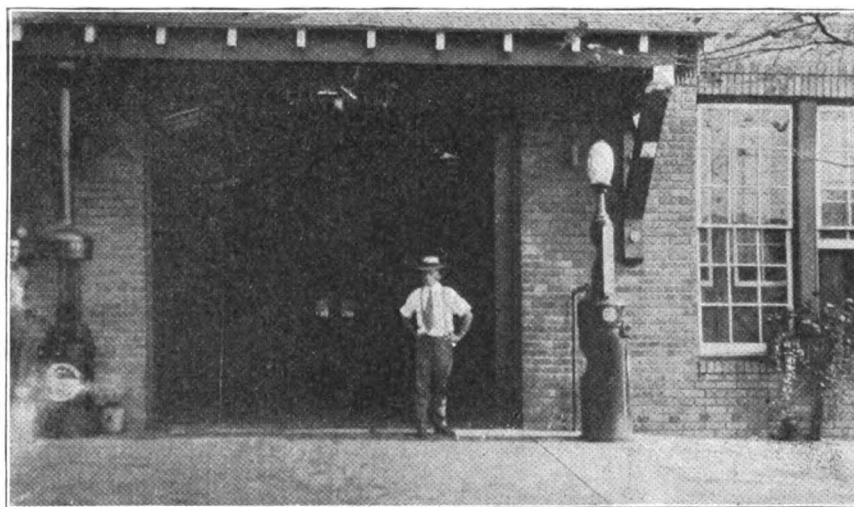
Not longer ago than the month past, a user of the automobile, who was a purchaser of one of the first cars manufactured in the United States, made a remark, in a speech before an automobile club, which struck the members forcibly. Among the members were many automobile dealers. Those dealers were not one whit behind the other mem-

bers in applauding the remark.

"For a great number of years," he said, "it has been true, that when a man's watch is out of order, he knows that if he takes it to a watchmaker, it will receive expert attention and give no further trouble.

"Surely, we should hope for the day to soon come when we can send our automobile into the shop, and have the same assurance—but that is not the case today."

Let's true up the front wheels.



A "Good Front" Garage Has Up-to-date and Attractive Additions.

cent of them—the premature wear is due to some fault in the machinery of the car. Perhaps the wheels are out of alignment. If this is the case, it is so obvious that it can be told at a glance by the tire dealer. Then again it may be due to loose or worn bushings, or perhaps the bearings are loose. The wear in either of these two cases will not be so marked, but it tells its own tale.

The tire always speaks truly. A good tire man cannot be deceived, because he has the most dependable witness in the world—the

# Glimpses in the Garageman's World

Every Garageman Is Interested in "Something Different"—The Automobile Repairs Co. in Philadelphia Has a One Day Service That Is Drawing Trade—It Does Some Dandy Advertising, Too—You Might Try It in Your Garage

## A Repairshop with a One-Day Service and Other Innovations.

The Automobile Repairs Co., of Philadelphia, Pa., is doing "something different" in the repair line. It has established a special one-day service covering valve grinding, brake adjustments and carbon removal.

If the owner drives his car in before 9 a. m., the company guarantees that the work will be finished in time for the car to be driven home in the evening. A corps of 12 mechanics takes care of the work.

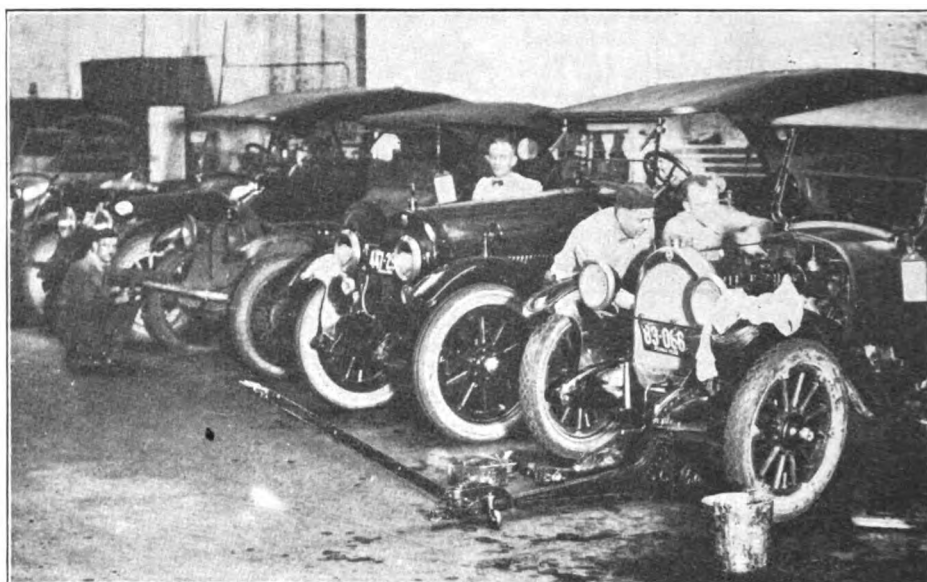
In addition to the one-day service, the company offers to inspect cars without obligation to the owner. An extensive advertising campaign lets the world know just what the Automobile Repairs Co.'s service is. Here are some expressions used in the company's advertisements:

**"The thing that pleases us—is the way our customers stick."**

**"When you're sick, you call the doctor—yet the average man will drive a sick automobile until its mechanism refuses to function."**

**"\$9.36—is that all I owe you?"—Our customer was surprised to receive such a small repair bill. 'Why I actually paid \$23.85 for the same job less than two months ago,' he said."**

**"Treat your car as you do your teeth."** Most people prevent a lot of misery and



There is an Air of Activity About the Shop Where 12 Mechanics Are at Work.

considerable expense by visiting the dentist regularly and often. You can do the same with your car if you will get the habit of coming here once a month and availing yourself of our free inspection service."

**"Repairs make or break the car."**

**"I'll try anything once."** Remember all that we ask of you is a trial. Come in."

**"Don't wait 'til the rush starts—that car of yours should be carefully inspected**

and all necessary repairs and adjustments made now."

**"Bring your car in tomorrow—We're ready to put it in shipshape order quickly."**

**"A full mechanical overhaul in 10 days."** We deliver a complete mechanical overhaul in 10 days and guarantee the job in every particular."

**"Come along—we're ready for you."** No matter how fast the repair jobs come in—and believe us they've been coming some this past week—we're ready for you."

**"We'll keep your car 100 per cent efficient."**

**"You pay for no lost motion here."**

## Woman Dealer Makes Record in Car and Tractor Sales.

The Ford company has an interesting dealer, Mrs. M. P. Estes, who sells something like 300 Ford cars yearly, to say nothing of the sales she also makes on tractors. Her only regret is that the company couldn't promise her more than 300 cars this year. She is said to be one of the most successful women automobile dealers in the entire state of Iowa.

Mrs. Estes is a thorough business woman. She knows her product and her territory; she knows how to sell cars and she also knows the value of business system, for that is her particular hobby.

The Des Moines branch manager says of Mrs. Estes: "This dealer knows her territory and has the largest number of cars according to the population of her territory of any dealer under this branch."



The Special One Day Service of the Automobile Repairs Co. Appeals to Car Owners.

# The Storage Battery and Its Care

If You Do Not Know How to Use a Hydrometer Properly, Now Is the Time to Learn—You Will Also Want to Know About Short-Circuiting, Sulphation, and Other Factors Concerning Storage Batteries — Final Installment

By R. H. Kasper

As the hydrometer is an indispensable adjunct in the care of storage batteries, every motorist has made its acquaintance—but very few know how to use it to its best advantage. The reading given by the hydrometer is simply the weight of the electrolyte as compared with an equal volume of water.

To express the density of a liquid in definite terms, it is necessary to adopt a standard density. As distilled water at 60 degrees Fahrenheit has been adopted as a standard, its specific gravity or density is therefore 1.000.

The hydrometer is based on the law of floating bodies—such bodies will displace a volume of the liquid in which they float equal to their own weight. If the liquid tested is of a low density, a greater bulk of it is required to equal the weight of the floating body, and the latter, therefore, sinks deeply into the liquid. If the liquid is of a high gravity, only a small amount is required to equal the weight of the body and it, therefore, sinks but little.

The depth to which a floating body will sink into a liquid is an indication of the specific gravity or density of that liquid. If the specific gravity of the electrolyte to be tested is 1.300, it will require a smaller bulk to equal the weight of the hydrometer than if water were used. The weight of that bulk would be 1.300, and as the weight of an equal body of water would be 1.000, the electrolyte is therefore 1.300 times the weight of water.

During the cycle of charge and discharge, the specific gravity of all cells of a battery should normally rise and fall together. Should there be a diseased condition of any of the cells, there will be a great variation in the gravity readings. By the regular and intelligent use of the hydrometer, the various diseases of the battery may be detected at their inception, and the fault remedied.

## Using the Hydrometer.

It is perhaps unnecessary to mention that hydrometer readings should be taken before adding water. As water is lighter than the electrolyte, it will remain upon the surface, giving a valueless reading. It is also advisable to read all cells of a battery.

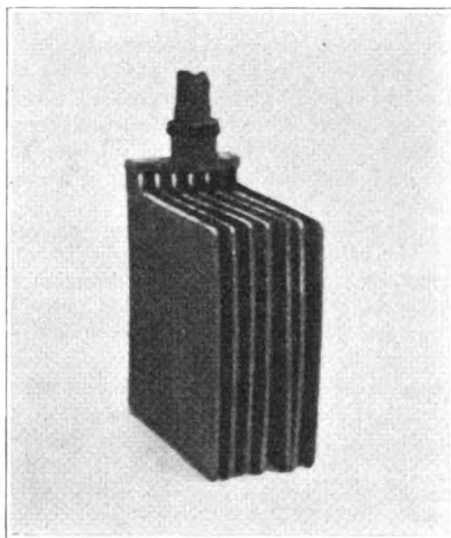
The advice of the battery manufacturers to take hydrometer readings frequently, may be religiously followed, and yet the motorist may be as much in the dark as before. Knowing that a fully-charged battery should read from 1.280 to 1.300, and a discharged one about 1.150, he can, of course, approximately estimate the amount of charge in his battery.

As long as the battery is functioning normally, the readings of the individual cells will vary but little. But in the life of every battery, the time will come when a distress signal is unmistakably flown. With the intelligent use of the hydrometer these signals may be readily detected.

The first signs of disease in a battery are indicated by a decided drop in the density of the electrolyte of one or more cells. At times, there may be a slight variation in the reading between individual cells, due to the fact that the water added to replace evaporation may not have been equal in each cell.

Such variations are so slight, however—.10 point or so—that they need give no cause for alarm. But when there is a decided drop—.50 point or more—one may be reasonably sure that something is radically wrong and measures should at once be taken to remedy the cause. A lowered specific gravity may be attributed to either one of two causes—a short-circuit, or a leaky jar.

A short-circuit in a cell effectually eliminates that cell as a current giving factor. A short-circuit may be due to a piece of metallic substance resting across plates of dissimilar polarity, or to the accumulation of sediment at the bottom of the jar, ris-



Positive Group. One Such Buckled Plate Cutting Through Separators and Touching Negative Will Short-Circuit Cell.

ing above the ribs of the sediment space and touching the two sets of plates.

Again, buckling of the positive plates—negatives rarely buckle—due to repeated charging and discharging, may have caused the positives to force their way through the separators and touch the opposite group.

The plates of any battery will buckle in time, a condition which is hastened by the enormous amount of current drawn by the modern electric starter.

## Buckling May Be Easily Explained.

During charge, a plate contracts; during discharge, it expands. The active material in a discharged positive plate is lead sulphate having a molecular weight of 302. During charge, the active material is gradually changed to lead peroxide, with a weight of 238.

Weighing less, the lead peroxide takes up less room and there is a shrinkage in the size of the pellets of active material. The lead grids supporting them are not elastic, and in time, the pellets may become loose and drop from the grids, adding to the accumulation of sediment at the bottom of the jar.

When the battery is again discharged, the resultant change to lead sulphate causes the pellets to expand and fill the place they formerly occupied. During repeated operations of charging and discharging, more active material is constantly formed, and space for this can only be found by stretching the retaining walls of the grids.

As the plates expand, they must have room to "grow". This necessary room is lacking because of the compact manner in which the groups are held in the jars, and as the plates are softer than their retaining vessels, buckling is the inevitable result.

No matter by what means a cell is short-circuited, the symptoms are the same. The cell attains a higher degree of temperature than the others; there is a total absence of activity or "gassing" of the electrolyte, together with a decidedly lower electrolytic density.

In the case of accumulated sediment the electrolyte may have a muddy appearance. The lower electrolytic density is caused by the total waste of the charging current sent through the cell. Instead of causing a physical change in the composition of the plates, the current simply uses the short-circuit as a by-pass. The result is that the plates remain in a sulphated condition, the acid is not returned to the electrolyte, and the density accordingly remains very low. There is but one remedy—the cell must be removed and the cause of the short-circuit eliminated.

## Leaky Jar

In the case of a leaky jar, there is no abnormal heating. As each drop of electrolyte that is lost carries with it a certain percentage of acid, the addition of water, to replace that loss, lowers the density of

the electrolyte. When any individual cell requires much more water than others in the battery, and if there are no signs of a short-circuit, one may reasonably attribute the low density to a leaky jar. Such a condition must be remedied at once.

#### Sulphation

Plates exposed to the air are liable to sulphation. This is not the normal sulphation due to charge and discharge, but is in the form of a hard white scale. This scale, being a non-conductor in itself, effectually removes the covered parts of the plates from further action. The charge and discharge is, therefore, confined to a smaller surface of the plates, lessening the capacity of the cell. The uneven action of the charge and discharge upon the affected plates will, in time, cause serious warping or buckling.

There are times, after a battery has been received from a charging station, that the density of the electrolyte exceeds the 1.300 mark. This is due only to one cause—improper treatment.

Instead of having received a full charge, an addition of acid has been made so that the battery, if inspected, will appear to be in a charged condition. Such improper treatment, by the unscrupulous, is all too common. The access of acid will cause an excess condition of sulphation on the plates, sealing the pores of the active material and doing injury to the cells.

This condition may be detected by the milky appearance of the electrolyte. Fortunately, it may be easily remedied. Draw a quantity of electrolyte from the cells and replace it with pure water. The cells should then be allowed to charge for some time so that the water and acid may thoroughly mix.

If another reading still shows a high density, the electrolyte should again be diluted; an operation which must be repeated until the proper density has been reached. The cells should be carefully watched for a few days to notice if there should be a further rise in the density, and if there should be none, it may be assumed that the excess sulphate has been eliminated.

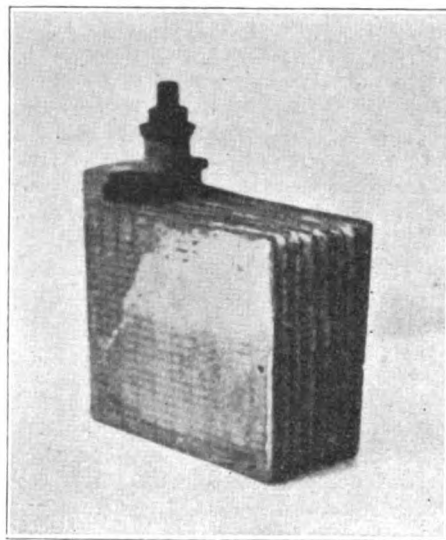
#### Reversal of Cell

The early detection of defective cells by the hydrometer has a decided advantage. The lessened capacity of defective cells is liable to cause a reversal of the polarity of the cells. The defective cell, naturally, is the first to become exhausted and the voltage rapidly drops to zero. The other cells, with their stronger constitution, are functioning normally and, therefore, take care of any demands for current supply which may be made upon the battery.

As the cells of a battery are connected in series, the current, both charge and discharge, passes through all of them. The discharge current is in the reverse of the charge. As long as the defective cell continues to produce its supply of current, it acts in harmony with the other cells. But as soon as it is exhausted and its voltage drops, it is at the mercy of its companions.

The discharge current must pass through the cell, and as it can offer no resistance to the flow, it receives this current as a charge current. But this charge current is in the discharge direction and a reversal of the polarity of the cell is the result.

This change of polarity of the plates is detrimental to the cell, as it changes the physical character of the plates, causes a



Negative Group. White Patch Indicates Abnormal Sulphate Caused by Exposing Plates as in Case of Leaky Jar.

layer of sulphate to form and hastens buckling and warping. When the voltage of all three cells drops simultaneously, such a condition is impossible as current will cease to flow when the lower limit is reached.

#### Exhausted Battery

When the electrolyte of all the cells in the battery has reached its low level (1.150) and there are no symptoms of disease, the battery should be given a thorough charge. Below that level, continued discharge causes a battery to rapidly sulphate and the evil of buckling is hastened to a great extent.

#### Care of the Battery

The value of the use of the hydrometer may be readily seen, as the detection of diseases at their inception adds much to the life of a battery. But even with a battery in good condition, the efficiency may be lowered by lack of care in minor details. The corrosion of terminals is an evil often encountered.

The "gassing" and creeping of the acid attacks the terminals of the wires. This is the cause of a layer of bluish substance forming around the battery connections, which in time becomes hard and offers an enormous resistance to the passage of current. A rag, saturated with ammonia, will prove of great use in cleaning connections, taking care that no ammonia enters the cells. This loosens the hardened corrosion, the terminals may then be well cleaned and then thoroughly coated with vaseline.

Again, the practice of allowing foreign matter to accumulate on the top of the battery is to be discouraged. Metallic ma-

terials may constitute part of this foreign matter, and if the terminals of the cells should be bridged, external short-circuits are the result.

When taking gravity readings, it is advisable to always return the electrolyte to the cell from which it has been taken. This practice will tend to keep the density of all cells practically equal.

Keep the battery fairly well charged in winter. Low acid is liable to freeze; the electrolyte of a discharged battery (1.150) is liable to freeze at zero. It is also advisable to immediately charge a battery after adding water in winter. This causes the acid and water to mix thoroughly, eliminating the danger of the freezing of the added water.

Never allow a battery to stand in a discharged condition for any length of time. This tends to cause a sulphated state of the battery.

The care which a battery requires is so small that there is no reason why it should not receive a maximum of service.

The care of a battery in service may be summed up in four rules, which, if followed, will result in increased satisfaction with the service obtained.

(1) Add nothing but pure water to the cells—and do it often enough to keep the plates covered.

(2) Take frequent hydrometer readings—and profit by those readings.

(3) Never allow a battery to stand in a discharged condition. Give a special charge whenever necessary.

(4) Keep the connections and the battery clean.

#### A War of Elimination on Avoidable Automobile Accidents.

With reports of deaths from automobile accidents coming in at an average of one every 35 minutes, and with this death rate increasing steadily, 25 men representing the automotive interests, insurance companies, the public, the industries, automobile clubs and various governmental agencies, met at the headquarters of the National Safety Council recently, to perfect plans for eliminating avoidable automobile accidents.

It was granted by most of the speakers at this meeting that some automobile accidents are unavoidable, but the consensus of opinion was that they are very few. Blame for the greater number of automobile accidents, which kill more than 10,000 persons and maim thousands of others every year, was placed equally upon the shoulders of careless pedestrians and reckless drivers.

A set of lessons and bulletins on the safe operation and maintenance of automobiles and motor trucks has been prepared by the National Safety Council for distribution among owners and drivers of automobiles and motor trucks.

These lessons and bulletins, when approved by the committee, will be distributed among automobile drivers.



# Welding, Cutting and Brazing Practice

Ways In Which Brass Welding Differs From Ordinary Oxy-Acetylene Welding—The Peculiar Characteristics of Brass—Some Jobs Encountered in the Ordinary Welding Shop — Make Haste Slowly Is the Rule to Follow

By David Baxter

The oxy-acetylene torch operator who is accustomed to welding iron and steel only, will find the welding of brass or other copper alloy quite a different proposition. He will probably discover that he must drop many of the little tricks and customs he has been employing on the other metals. In fact, he may have to entirely change his style of torch manipulation; meaning that he cannot use the same size flame applied to the metal in the rough and ready way that it may be used on heavier jobs of iron and steel.

In the first place, brass has several peculiar characteristics that are not found in other metals, which must be taken into consideration when welding. The chief of these is that brass is made up of two or more distinct kinds of metal, each of which has a different melting point—and this difference varies widely. Even when combined, these metals have a much lower melting point than iron.

From this it will be seen that brass will melt much easier than iron and will, therefore, require a smaller flame in proportion to the job; the manipulation, as a result, must be more deft, a lighter, quicker touch, so to speak. If the flame is too ardently applied to brass, the metal will burn very easily compared with iron.

The variation in melting temperatures of the constituents of brass bring up another trouble that iron welders are not accustomed to meeting. If the flame is not correct, or is not correctly applied, the components of brass that have the lower melting point, will melt first and tend to burn up if the other metals are not soon melted and mixed together again. And where the brass is made up of three or more metals, the complications are multiplied; providing, of course, that the flame and the handling of it are not what they should be.

In other words, the welder must endeavor to melt the higher metal without destroying the others, which is somewhat difficult for the novice. After the novice has had some practice, however, and becomes accustomed to the handling of alloys, he will soon learn to fuse the two or more metals as one.

The process would not be so complex if the welder was certain just what and how much of each metal had been used to make the brass. But this is next to impossible, since there are many varieties of brass used in an infinite number of articles. So the welder had best learn to judge the nature of the brass as a whole, by the way it acts under the welding flame; keeping always

in mind the low melting point of a possible component.

There is no practical way for him to judge how much of each, or what kind of, metals compose the different brass jobs he will be called upon to weld, but he can be fairly certain that nearly all of them contain zinc. As zinc is the metal that causes the most trouble in welding brass, he is able to control the welding accurately enough for everyday purposes.

The zinc burns, or turns to oxide, very easily, due to its low melting point, so that the welding flame is not played upon a brass job very long without burning the zinc out of the mixture. When this is done, the weld is weak and porous and will not hold as it should.

The burning zinc is detected by the smoke fumes arising from the weld and sometimes by the fine white particles that arise in the smoke. These particles are zinc oxide and are often finely subdivided, floating, almost imperceptibly, in the air. Once the zinc has turned to this oxide, there is no way for the welder to change it back to metal. It is readily inferred from this that brass containing high percentages of zinc

handled carefully, with a smaller welding flame, or with a flame not so intense, as would ordinarily be used on cast iron.

To meet these requirements, some welders employ a smaller size torch or tip. Others depend more upon working with the point of the flame farther away from the weld, while others do not pay so much attention to the flame size and its distance from the weld; they endeavor to achieve the same result by regulating the flame differently. In other words, where the first two use a strictly neutral flame, the later class use what is termed a reducing flame—one having an excess of acetylene in its makeup.

This excess of acetylene reduces the amount of heat for a given size flame. The lesser amount of oxygen in the reducing flame also lowers the danger of oxidizing the brass because it is principally due to the oxygen that the zinc is destroyed. An excess of oxygen in the welding flame would cause the rate of oxidization to be higher than when using the neutral flame.

A reducing flame is also a milder one and, for this reason, probably a safer one. A neutral flame may be a dangerous one due to its penetrating power. This flame may have such force that it will cause oxidization by its power alone.

But another complication arises, which is due to the fact that copper is very good conductor of heat, and that the heat of the weld is carried away rapidly to the surrounding metal. This, in turn, means that there is danger of selecting a torch tip too small since the casting may draw the heat away from the weld so fast that it will not fuse properly, thus arguing for a larger flame than is used on a cast iron job of the same weight.

A careful welder will take this into consideration when welding high grade brass. As has been pointed out, the choice of flame size, kind, and its manipulation are much a matter of individual ability; what one can utilize successfully, another may find troublesome. Therefore, it is probably better not to recommend one above the other.

Whichever the choice, however, the tip of the welding flame should be held about a quarter inch above the melting weld and should be kept continuously in motion. This does a great deal toward eliminating the oxide. The welding should be rapidly and deftly accomplished, for any lingering over any part of the weld only exposes it to oxidization.

This brings out the point that the torch operator should not try to melt too deeply, but should commence to add filler metal

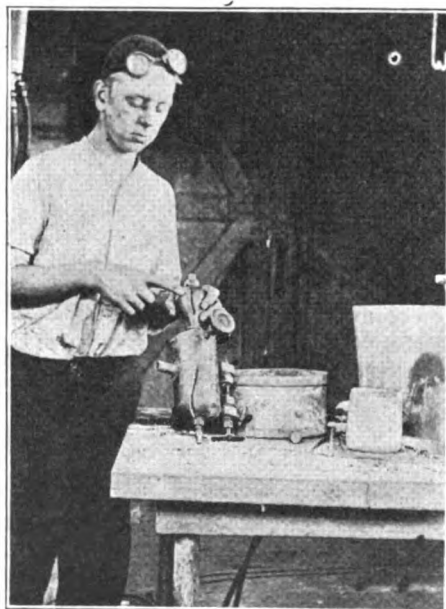


Fig. 1—Location of the Cracks Which Are Grooved in Preparation for Welding.

is easily ruined by careless flame manipulation. A lower percentage of zinc only means a trifle less danger of oxidizing.

If it is true then that nearly all brass contains zinc and that the zinc, due to its low melting point, is what causes the trouble, we know that brass jobs are to be

as soon as the surface is fluid. A thin layer, added rapidly to a shallow fluid surface, will give better satisfaction than a thick layer added to a deeply fluid weld, although the latter is the correct way if it is done properly. However, it is only with practice that the average welder is able

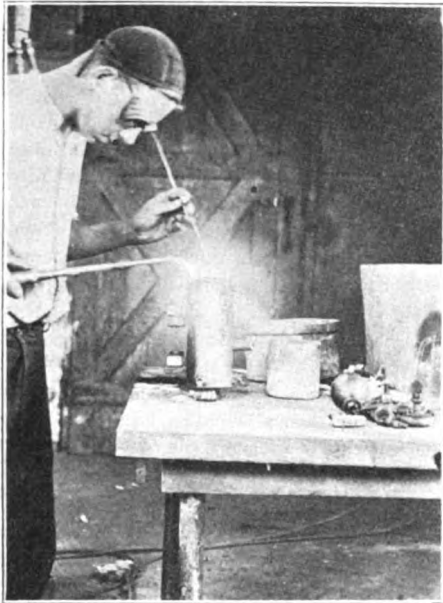


Fig. 2—First Welding Position of the Main Casting.

to do it properly. A large supply of filler metal clogs the weld and tends to produce a poorly connected bond.

The choice of filler rod is another matter upon which it is hard to give explicit instructions, due to the complexities of the subject. As a rule, it is no doubt better to use a rod smaller in diameter than for an iron job of the same dimension, because a goodly supply can be melted on short notice if portions of the weld respond rapidly to the action of the flame. On the other hand, there is no danger of an oversupply in ordinary circumstances.

A little experimental practice will do more along this line to establish the correct filler size than a volume of printed matter, but, whatever the selection, it is necessary to employ a good flux during the entire welding process.

Several articles the size of this one would be required to discuss the welding of brass in its many classes and no attempt has been made here to more than cover the things that are liable to be encountered any time in the average welding shop. The example used is in reality a job of fusion welding although some might term it brazing. In fact some welders might attempt to make a brazing job of it, which would be a risky proposition since the device is a steam lubricator that must withstand considerable pressure so that a brazed joint might not hold.

One more pointer concerning the welding of brass before passing to a specific example of the art as it applies to common jobs: Brass is very weak when in a heated con-

dition and will break or crumble if put under the least strain. This, of course, means that the welder should be very careful about moving a red-hot brass job lest he break it beyond repair. A light tap with a hammer or the torch may cause the whole job to collapse; a large hole may be pushed through the side in an attempt to churn the weld or to puddle the weld as it is sometimes called; or the casting may collapse of its own weight if it happens to be the right shape and size.

The illustrations show a quite common steam lubricator made of cast brass, with two cracks caused by freezing. One crack is in the main body of the lubricator, Fig. 1, and one in the upper chamber.

A casting of this sort will serve to illustrate the theory of brass welding since the composition of the metal in the device is usually a common alloy. These castings contain both extremes—copper and zinc—so that instructions for welding them will cover a wide variety of brass castings, and thus enable the novice torch operator to handle most brass jobs since he need not materially change the procedure.

The first thing to do is to take the lubricator apart. The main casting is stripped of most of the loose parts, particularly the oil-glass tubes. It is more convenient to weld the parts separately, so the upper chamber is screwed out of the main casting.

All oil is drained out of both chambers to eliminate as much as possible the danger of catching fire. All of the valves and other openings are left open to prevent gas from generating and collecting inside of the casting due to the heat of the welding. There is some danger of an explosion if the gas collects and is ignited; it should have a ready outlet.

Next both cracks are V-grooved the same as for cast iron jobs. The brass is filed away on each side of both cracks to form a wide groove the full length and almost the full depth of the metal. This grooving is for the purpose of permitting the weld to be made the full thickness of the casting with the shortest possible application of the flame—that is, the weld can be made in the groove without exposing the brass to as much danger of oxidizing as there would be if the crack were not grooved, because it is not necessary to play the flame over the weld so long.

The vicinity of the cracks is also thoroughly cleaned about the same as for cast iron. About an inch along both sides of each crack is scraped bright to prevent foreign matter or surface impurities from melting and entering the weld when the torch flame is applied.

The main casting is welded by standing it on end as indicated in Fig. 2. Then when the welding reaches the shoulder, the casting is placed on one side with the groove uppermost. In this way the weld is kept horizontal, thus enabling a better weld to be made, as the welder does not

have to contend with the metal flowing or piling up.

The weld on the ball part is made with the end of the ball fastened in a vise, groove upward, where its position may be easily changed to keep the weld horizontal. This part of the process is indicated in Fig. 3.

In both welds the flame is applied slowly, with the filter held in readiness for instant use. The fusion is accomplished as rapidly as possible, but there is great danger of spoiling the weld by hurrying too much—that is, the flame should not be brought instantly in contact with the groove, but should be held back several moments to permit the heat to soak into the brass.

At the same time, it is revolved slowly in concentric circles, and at no time is it permitted to approach closer than a quarter of an inch from the groove. In other words, the tip of the welding flame is not held closer than a quarter of an inch. When welding brass, the flame should not be allowed to lick the metal. A soaking heat is preferable to a direct heat.

As the brass starts to glow, the filler is brought close to the flame and as the groove melts the filler should be melting. The molten filler is added as soon as the groove is melted. Only enough to fill a short portion of the groove is added, at which instant the flame is moved onward to melt another portion of the groove. Meanwhile another bit of filler is made ready to deposit in the molten groove. Thus the



Fig. 3—Welding the Ball Part of the Lubricator.

length of the groove is filled a bit at a time, applying flux with each bit.

A Tobin bronze filler or a soft brass wire is used—a rod 3/16- or 1/8-inch in diameter. It is given a twisting motion as it is applied to the groove to assist in the fusion. At no time is it allowed to

(Concluded on page 40.)

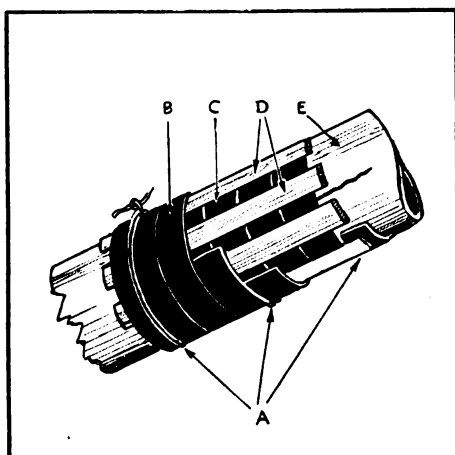
# Readers' Questions and Answers

## Checking Fuel Pipe Leaks.

Kindly publish in one of your early issues a simple emergency method for stopping fuel pipe leaks. As a subscriber to your publication, I wish to say that I get many valuable suggestions from your Readers' Questions and Answers Department.—R. E., Mont.

Here are two such methods:

If the break or crack is near the center of the fuel line, a winding of tape, C, should be made over the break and this followed by placing several strips of wood, D, lengthwise over the first winding. A second winding of tape, B, is then made over the splints and this is reinforced by three separate windings of string, A, as shown in the accompanying illustration if the break is not more than



Details of Fuel Pipe Repair.

three inches. Use more string if necessary.

If the break is not near the center, a temporary repair can very easily be made by slipping a section of rubber tubing over the metal pipe, E, extending about three or four inches on each side of the break. In this case, a twine winding should also be made as described.

\* \* \*

## Trouble with Carter Car.

I have been reading your magazine for three years and in that time I have gotten a lot of valuable hints. This is the first question I have sent in and hope you'll be able to publish an answer in one of your early issues. An old Carter car (friction drive) was brought into my repair shop. It fails to drive properly. Some information as to the trouble will be greatly appreciated.—H. L., Ida.

Failure to drive properly in a friction-driven car may result from the following conditions:

Accumulations of oil on the frictional surfaces, thus reducing the amount of frictional adhesion.

Wear at the face of the aluminum member.

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

Spring or lost motion in the counter-shaft.

Lost motion at the various members of the pressure linkage that would prevent positive contact of the frictional elements.

Diminution of power will result in a serious degree from increased friction, when the thrust bearing to which the pedal pressure is applied works stiffly, or when the bearings supporting either the cross or main shaft are defective.

When slipping occurs, a thorough examination should be made to determine whether or not there is excess oil between the contact surfaces. Such excess oil should be eliminated by washing with gasoline, then covering the surface of the aluminum plate with talc or Fuller's earth.

Perfect driving is impossible if the metal surface of the driving member is rough or grooved. This condition should be remedied by refacing the surface so that it is perfectly smooth. Deep grooves ne-

by use of moderately fine emery cloth held in a wooden holder and operated by hand.

\* \* \*

## Too Much Oil.

We have in service a new Hupmobile touring car driven about 700 to 1,000 miles that uses entirely too much oil, one quart to every 40 miles. The crankcase is tight and doesn't leak a bit. It all burns out. Advise cause and remedy.—J. J., Ind.

We would suggest that the trouble is due to scored cylinders or very poorly fitted piston rings, assuming that there are no leaks in any of the pipe connections. If the cylinders are scored, they will permit the oil to pass up by the pistons into the combustion chamber where it is burned and passed out the exhaust.

If this is the trouble, the cylinder must be reground and fitted with oversize pistons and rings, or new cylinders, pistons and rings.

If the cylinders are not scored, the chances are that the piston rings are poorly fitted, and can be replaced with a new set of rings more carefully fitted. Perhaps a good leak-proof ring fitted to the bottom groove of each piston would help considerably in keeping down the oil.

We would also recommend that the new rings be put in before any further mileage is run up on the car, thus eliminating excessive wear on the cylinder walls, before the rings are put on.

\* \* \*

## Freezing Temp. of Electrolyte.

I am an owner of a garage of 60 cars capacity and as a side issue am going to institute a battery repair station. I am planning to have a window display placard made showing the various temperatures at which electrolytes of different specific gravities will freeze, as an advertising "stunt." At the bottom I will insert in large type, "Have Your Batteries Fully Charged When the Cold Weather Comes!"

Can you supply me with such information? Do you think my idea is a good one? —M. G., Ind.

As an advertising idea, your plan is excellent. The following is the requested tabulation:

| Specific Gravity | Condition of Battery                | Degree F. at which Electrolyte will freeze |
|------------------|-------------------------------------|--------------------------------------------|
| 1.120            | battery completely discharged       | 20° above zero                             |
| 1.160            | battery $\frac{3}{4}$ th discharged | zero                                       |
| 1.210            | battery $\frac{1}{2}$ discharged    | 20° below zero                             |
| 1.260            | battery $\frac{1}{4}$ th discharged | 40° below zero                             |

cessitate mounting the driving disk in a lathe and running a cut over the surface in a light chip. However, if the roughness is not serious, resurfacing may be accomplished by turning the disk with the motor at high speed and applying a scraper. Complete smoothness is then attained

It will be seen that in order to avoid freezing of the electrolyte in the storage battery, it should always be kept in a fully charged condition. Great care must be taken and constant inspection made, therefore, when a battery is stored for the winter.

### First Cord Tire.

Please tell me the name of the first tire company to make an automobile cord tire. Some say Diamond, some Goodrich and others United States.—R. M., Cal.

The B. F. Goodrich Rubber Co. gives the following explanation of the matter:

"To attempt to answer as to who made the first cord tire, and give proof, without entering into a long-winded history of the case is not easy. Nevertheless, we are glad that you have given us the opportunity to be of assistance to you. Nearly every tire company has in some way laid claim to being the first manufacturer of cord tires for automobile uses, and has so advertised. Each bases its claim upon some half-truth which the public that reads, if it does read, has no way to check up, or possibly no interest in proving or disproving.

"The truth is that the present cord automobile tire was not invented—it was developed. And this applies regardless of who makes it.

"The first pneumatic cord tire ever made was not an automobile tire. It was a bicycle tire made before automobiles were out of their swaddling clothes. John F. Palmer, of Chicago, was the inventor; the year of the invention was 1892.

"The patent rights were promptly purchased by the B. F. Goodrich Co. and as owners of the patent, the Goodrich company was the sole maker of Palmer cord bicycle tires during the life of the patent. This Palmer cord bicycle tire was gradually developed for automobile use as the

demand for automobile tires became apparent.

"Two Englishmen, Sloper and Gray, invented in Great Britain a similar tire for the same purpose and developed it for automobile use, under the name of Silvertown, the place where they lived. Their automobile tire was not patented until 1904.

"In 1910 the American rights were purchased by the Diamond Rubber Co., of Akron, Ohio, and, of course, came into the possession of the B. F. Goodrich Co. in 1912 when the consolidation of these two companies took place. The Goodrich company has developed its present Silvertown cord tire by utilizing the good features of both the Palmer and the Gray and Sloper patents, improving upon them and modifying the construction until today the Silvertown cord tire would not be recognized by either of these originators.

"These are dates that can be easily verified by anyone who cares to take the trouble to browse through the patent files. I don't believe any cord tire patents will be found which antedate these."

The United States Tire Co. says: "In 1903, the G. & J. Tire Co., of Indianapolis—then and now a part of the United States rubber system—manufactured the first cord tire for automobiles that was made in America."

\* \* \*

### Size Carbureter to Use.

It will be greatly appreciated if you will give me some information on what size carbureter to use for the Continental Red

Seal motor. I am planning a little advertising stunt for my garage and accessory store by building, for display, an automobile assembled with parts from different companies, i. e. no two parts of the machine are to be from the same car.—J. DeW., Ia.

We will make our answer general. The size of the carbureter should be determined by the area of the valve opening on the motor. This is a true measure of the motor's capacity; the cylinder displacement is not. It is impossible for a carbureter to deliver more charge to a cylinder than the area of the valve opening will allow to pass.

\* \* \*

### Valve Grinding.

Is it possible to over-do valve grinding? My car has been giving motor trouble a great deal lately due to carbon. The grade of gasoline which the locality in which I am stationed forces me to use is very poor. Consequently it has been necessary to grind in the valves about every 1,000 or 1,500 miles. Is this injurious to the motor?—A. K., Tex.

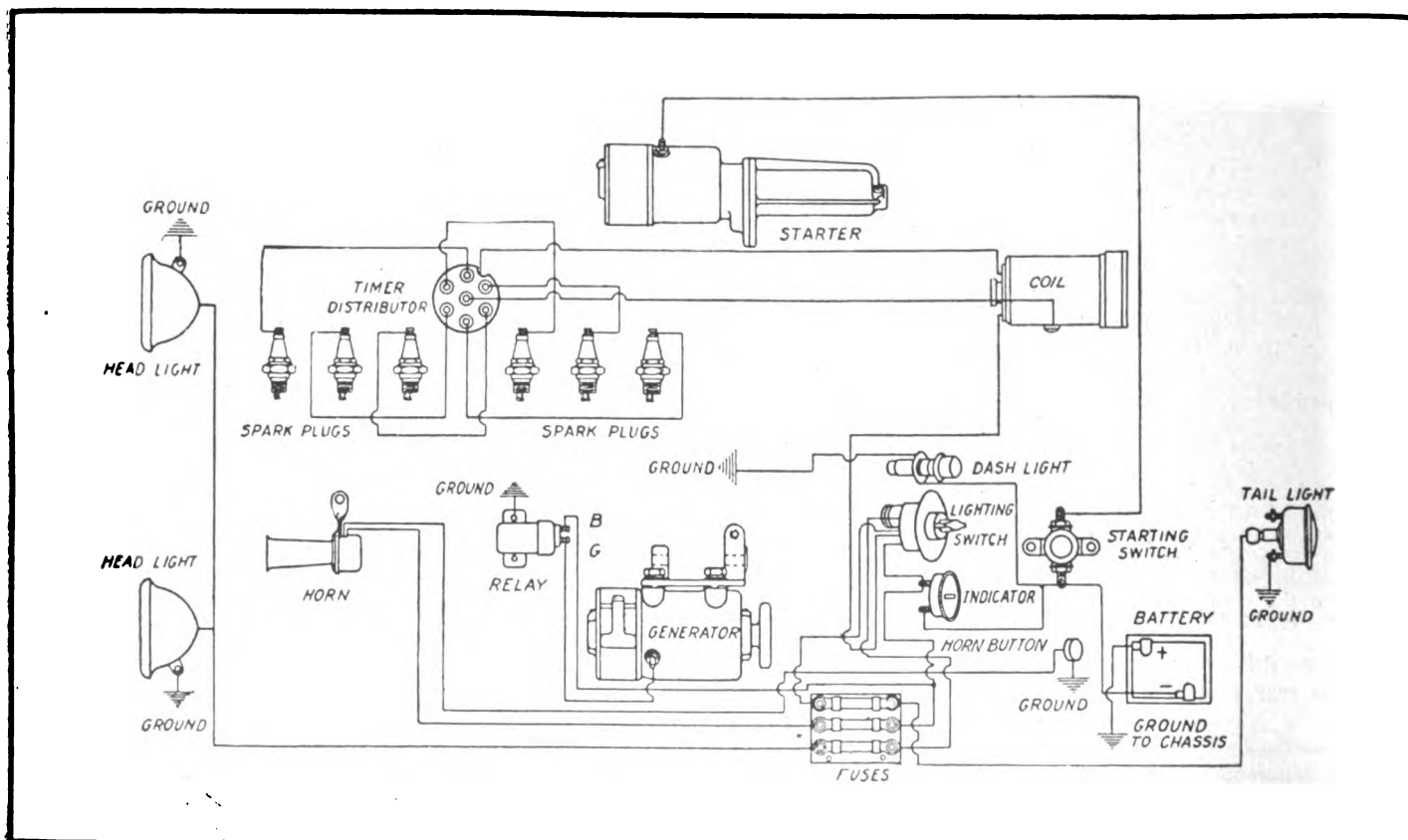
Too frequent grinding cuts down the valve seat and also widens it. In such a widened condition, it is more apt to give trouble than if it were simply carbonized, for a wide seat will not stay as tight as a narrow one.

\* \* \*

### Wiring Diagram.

I would like to see a wiring diagram of the Saxon car. Can you publish one in the near future?—P. W., Ill.

The Saxon wiring diagram will be found on this page.



The Wiring Diagram of the Saxon Car.



# Practical Hints for Shop Mechanics

## Cleaning Porcelain.

Cut a piece of hard rubber from the bead of a tire and you will find it excellent for cleaning spark-plug porcelains without injuring the glazed surface. The rubber discloses cracks that otherwise escape attention.—F. K., La.

\* \* \*

## A Handy Mixture.

Many garagemen have learned the advantage of keeping on hand a half-and-half mixture of benzole and denatured alcohol. It is usually kept in a quart bottle and labeled "Remover."

It is a remover in every sense of the word. An ounce poured into each cylinder of an automobile engine, and allowed to stand from two to 12 hours, will loosen up the carbon so that it will be blown out through the exhaust when the engine is started.

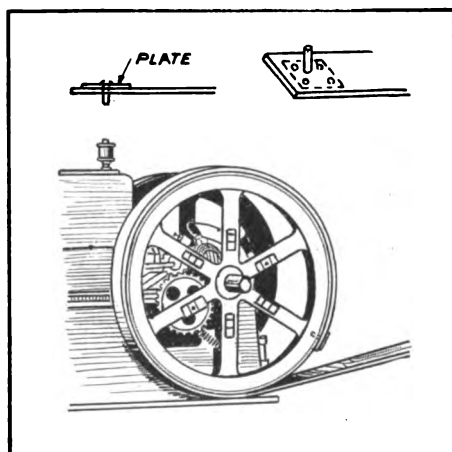
It is also a paint remover. Simply apply a little of it to any painted surface which it is desired to clean, and in a few minutes the paint will soften up.

It is also a spot remover. This mixture will remove spots from any fabric without injury of any kind, and without leaving a spot. And it will also be found a blessing in cleaning the hands of grease and grime that have been ground into the pores of the skin, and which ordinary mechanics' soaps will not touch.—J. E. D., Ohio.

\* \* \*

## Gasolene Engine Runs Compressor.

I have a gasolene engine which I use to run my air compressor and other machinery. The engine sets so close to the



Running Compressor by Gasolene Engine.

wall that a crank cannot be easily used.

A  $\frac{1}{4}$ -inch hole drilled in the face of the flywheel about  $\frac{3}{4}$  inch deep and a piece of old belt with a  $\frac{1}{4}$ -inch rivet in the end of it serves as a crank.

Insert the rivet in the hole of the fly-

## ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

wheel and wrap the belt almost around the wheel. A vigorous pull on the belt will turn the engine over rapidly.—J. P. M., Kans.

\* \* \*

## File Handle.

An old wrist pin can be made into a file handle by driving it onto the end of the file with the slot toward the blade.—G. H., Ill.

\* \* \*

## Misfiring at Low Speed.

Poor engine operation at low speeds is a common complaint, with the usual cause in the carburetion system. Often an air leak throws out the carbureter adjustment so that an insufficient amount of fuel is fed.

Wide spark-plug gaps with a magneto having weak magnets is a combination which may induce this same trouble. With a battery system in use, the ignition may be neglected until the carburetion system has been attended to. If this fails to locate the trouble, the ignition should then be overhauled.—R. L., Mich.

\* \* \*

## Stuck Piston.

It happens occasionally that in putting in a piston from the bottom of a cylinder the piston goes too far up and one or more rings expand in the combustion chamber. If the engine has a non-detachable head, this means trouble. Here is the way to get around it:

Remove the valve caps and turn the piston with the connecting-rod until the slot in the ring can be seen. Take a piece of very soft copper wire and insert the end under one edge of the ring.

Have some one turn the piston while the operator guides the wire so that it passes around the outside of the ring while the piston is turned. When the slot again appears, draw out the ends of the wire and pull them together.—R. S., Pa.

## For Sticking Wheel.

When you are confronted by a sticking wheel on a taper axle and have no wheel puller at hand, here is the solution: Run the nut off entirely and then run it on again with the castellated end toward the wheel.

True the other end of the nut up flush with the axle, letting the wheel down onto the ground from the jack. Now hit the nut three or four smart taps with a hammer and the wheel will start every shot.—A. T., Cal.

\* \* \*

## Convenient Way To Pour Oil.

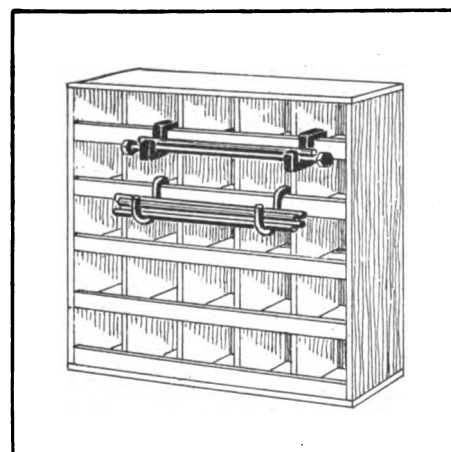
There are few garage keepers who have the right-shaped nozzle or funnel handy when a car comes in for oil. The garageman must first look under the hood of the car and then find a funnel that he thinks will fit. Even in the standard makes of cars there is often a horn or other obstruction in the way of the oil feed.

An ingenious way to overcome this difficulty is to take an old piece of horn tubing about 10 inches long, which can be found lying about any garage, and solder it onto the short nozzle of the oil can. The increased length and the flexibility of this spout makes it possible to reach any oil feed quickly, conveniently, and without spilling the oil.—C. F. B., Mass.

\* \* \*

## Stock Racks on Parts Bins.

Almost all garage stockrooms have the time-honored stock or parts bins. Recently there came to my notice one place where the parts bin is made to do double duty by the simple trick of making a few



Stock Racks Make a Double Duty Bin.

S-shaped hooks to hang on the fronts of the bins.

These hooks to hold long parts, such as truss rods, bolts, shafts, etc. The idea is simple and there may be a few who can use it, but perhaps have not thought of it.

### Wheel Bearing Adjustment.

Whenever a wheel fitted with a cap and cone bearing is removed, the cup of the bearing is removed with it and the bearing must be adjusted in replacing the wheel. The proper way to do this is to turn the bearing up tight and then move the wheel a few times by hand. This does away with any tendency to backlash.

Next, the adjusting nut is backed off very slightly so that by grasping two spokes into line, one above the other below the hub, a slight shake is felt in the wheel. This movement should be just barely perceptible and if it is more than this, it is too much and this adjusting nut should be a little tighter. When this condition has been attained, lock the wheel in place.—P. M., Pa.

\* \* \*

### Pounding In Engine.

If a pound in the engine is regular and continuous, it is likely to be from lost motion in the bearings. If it is irregular and occasional, it is more likely to be due to preignition, caused by incandescent carbon or from imperfect electrical connections.

If the pounding is accompanied by occasional missing, especially if the missing is more frequent when the car is running than when the engine is idling, it is more apt to be due to imperfect electrical connections.—A. T., Cal.

\* \* \*

### Detachable Oil Pan.

To make a quick detachable oil pan, cut six springs about four inches long from a pair of ordinary screen door springs. Take two turns back on each spring and attach a nail to each, bending it in the shape of a hook in each case.

Next drill three holes in the bottom of each sill at the points where the springs are to be attached, and also through the pan, far enough down to put the springs under considerable tension when they are placed in position.

Drop a nail through each hole to the sill and turn hooks on them with pliers. Next attach the free ends of the springs to these hooks and, after gripping the hooks for the pan with the pliers, insert them in the holes already drilled for their reception. It may also be necessary to place two springs under the radiator.—B. L., Miss.

\* \* \*

### Battery Marking Tool.

An old star drill, bent roughly in the form of a U, with a plus sign ground on one end, and a minus sign on the other, makes an ideal tool for marking battery terminals.—M. R., Mich.

\* \* \*

### Balancing Wire Wheels.

I find that it is always well to look to the balance of wire wheels. In order to reduce the magnitude of the centrifugal force of excess weight on one side of the wheel this latter should be balanced just as a fly-wheel is.

To do this jack up the wheel and revolve it slightly to determine which side is the heavier. Then wind a piece of electrician's tape around a spoke on the opposite side of the wheel.

Continue this process until the wheel remains in any position in which it may be placed, showing that the weight is equal on all sides.—A. L. T., Cal.

\* \* \*

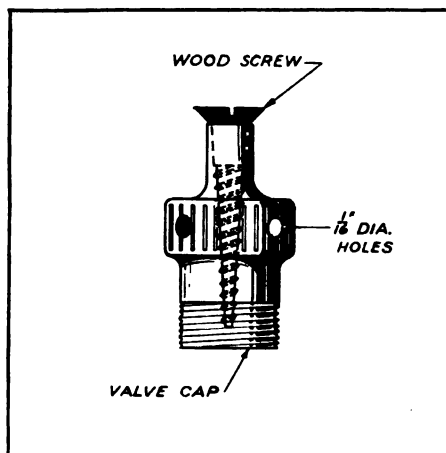
### Rusted On.

Two parts of iron or steel that have become rusted firmly together may be separated by soaking them for several hours in a mixture of one-third lubricating oil and two-thirds kerosene.—L. T., Cal.

\* \* \*

### Tube Deflator.

Use an old valve cap and remove the rubber washer. Drill two or more 1/16-inch holes in the cap as indicated in the accompanying illustration. Then force a wood screw in the top and let it extend



Easily Made Tube Deflator.

nearly to the bottom of the cap. File the end of the wood screw off flat.—P. B., Pa.

\* \* \*

### Sled for Hauling Storage Batteries.

When storage batteries are removed at a distance from the battery section, it necessitates a tiresome trip with a heavy battery to the bench. Several battery sleds can be made from a wide pine board with a slight railing on the sides.

Bore a hole in the front end and insert a piece of wire for a handle. The sled may be easily dragged over a concrete floor and will save carrying the batteries.

The board should be planed smooth on the underside and front end beveled so as not to catch when dragged over the floor.—R. W., Mo.

\* \* \*

### Grinding Valves.

I find that considerable time can be saved, when grinding valves, by taking all the valves and truing them in the lathe, and also reaming the seats. Then the grinding is only a question of a few minutes and you are sure the valves are true and properly seating; besides you have a better running engine and a more lasting job.—A. L. M., Mass.

### Spark-Plug Spacing.

Sometimes it becomes necessary to re-adjust the distance between the contact points of the breaker.

The common error is that of setting these points too far apart; the proper distance is approximately 1/50th of an inch and this may be taken as the standard. Incidentally, the width of the spark gaps has a great influence on the functioning of the ignition system.—G. P., Ohio.

\* \* \*

### Put Graphite in Oil.

The addition of a little pure flake graphite to the lubricating oil is a help to motors that have seen some wear. Only pure motor graphite should be used. It forms on the metal surfaces, reducing wear and filling up scores in the cylinders.—M. C., Ohio.

\* \* \*

### Adjusting Vibrator Springs.

In cases where excessive current consumption develops in connection with vibrator coils, the condition will probably be found to be due to excessive tension on the vibrator springs.

The spring adjustment should be loosened until missing develops in the motor and then tightened until the engine begins firing regularly again. When the tension is tightened beyond this point, excessive consumption results.—A. T., Cal.

\* \* \*

### Wheel Blocks for Small Cars.

Some mechanics like to have the small car raised a few inches when it is necessary to work under it, such as in tightening connecting rod bearings. This relieves cramped arms and makes it easier to get the creeper under the car.

Two pieces of 8-inch by 8-inch material may be sawed so as to make an inclined plane. The car can then be driven up on the blocks. To the upper surface of the blocks nail a side rail of 2-inch by 2-inch material.—T. W., Mo.

\* \* \*

### Valuable Clamp.

An excellent little C-clamp can be made from a large-sized square nut. The threads are filed out and a section of one side is cut away, after which the part is drilled and topped for a small set screw.

\* \* \*

### Saving Time in Handling Tires.

The garageman who removes a tire to repair a puncture and in so doing laboriously removes all of the rim nuts, is wasting valuable time.

The wheel should be turned so that the valve stem is at the top, and the two holding lugs on either side of the stem need not be touched. Simply unscrew and remove the other three nuts with the lugs, give the bottom of the rim one or two taps from the inside with a hammer, and the tire and rim can be easily lifted off.

When the repair has been made, simply lift the tire and rim over the two untouched lugs, then replace and secure the other three.—J. E. D., Ohio.

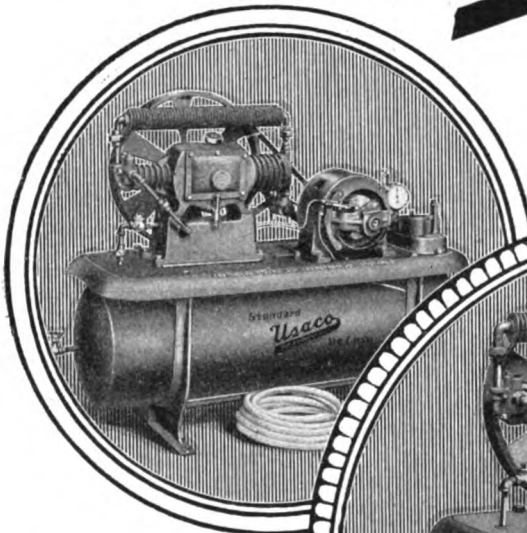
# Two Stage *Usaco* Air Compressors

## Usaco Prestige is Based on Incomparable Quality

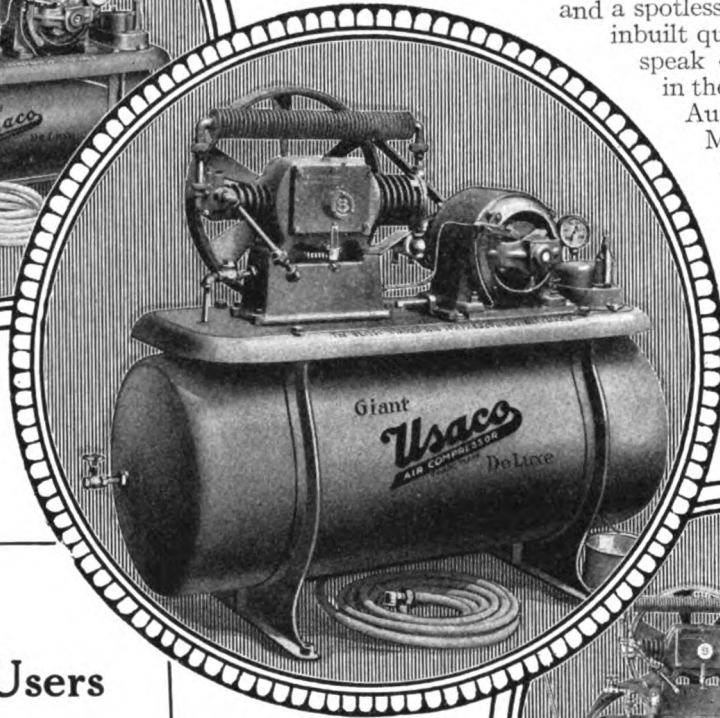
Quality alone builds a long life of prestige and a spotless reputation. And it is this inbuilt quality that causes people to speak of Usaco Air Compressors in the same breath with Packard Automobiles, Singer Sewing Machines and a host of other high grade products.

Dissect a Usaco Air Compressor and in every part you'll find an added touch of quality and dependability.

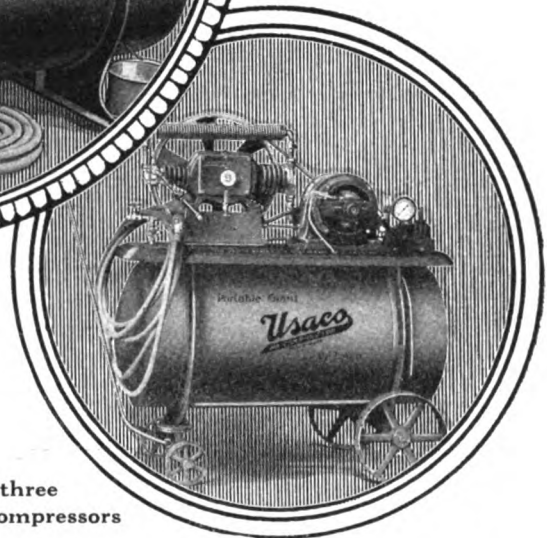
Here, then, is the real reason why Usaco Air Compressors dominates in Garages, Tire Shops and filling stations—places where the business flourishes on dependable service and quality products.



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Inspect the Complete Usaco Line, Week of November 15th, 1920.  
Chicago Office: 1124 Michigan Avenue.

## WELDING, CUTTING AND BRAZING PRACTICE.

(Concluded from page 34.)

drip into the groove but is placed directly into the molten metal. The filler rod is also used to apply the flux by dipping a heated end of the filler rod in the flux powder at frequent intervals.

No pre-heating is used on this job unless the heat appears to be drawn away too fast by conduction. In this event, the flame is passed back and forth along each side of the groove to furnish a supply of heat for conduction purposes, but in this, care is taken not to get the metal too hot on account of its fragility when red hot.

It is probably better, especially for the beginner, not to try to melt the weld down smooth, but to leave it in ripples or in knoblike projections, thus avoiding a great deal of danger of burning the metal. A weld that looks more like a brazed job is, no doubt, safer for him, and yet, this lubricator should have a true fusion weld and not a brazed joint, since it has to withstand the steam pressure and should not be left dangerously weak.

In cooling both parts of the lubricator after welding, it may be safer to wrap them in asbestos paper because some brass castings shrink and crack like cast iron and, therefore, need slow cooling. When cold, the surplus metal should be ground off, or filed smooth and rounding if not flush with the surface. If there are any pin holes, they are caused primarily by the burning out of the zinc and will, no doubt, lead to leaks in the lubricator if not re-welded.

Thus we see that the chief essentials of brass welding are rapidity without burning the weld, and plenty of heat not too ardently applied. In old classic words: Make haste slowly when welding brass.

## U. S. Capital Garage Presents Attractive Features.

One of the finest garages in Washington, D. C., is the Wardman Park Inn. A service station and all necessary equipment

## Keep Muffler Clean If You Want to Have Efficiency.

The purpose of the muffler, which is usually the most neglected part of the car, is a distinct and beneficial one, namely, to muffle the noise and give a comparatively silent exhaust, providing at the same time for a free escape of burned gases.

In the operation of the engine, the exhaust valve opens while the burned gas is under a pressure of 25 to 30 pounds per square inch. The muffler provides a chamber where the exhaust gases may be expanded and cooled and in this way lessens the pressure. By permitting the gases to pass off slowly through many small passages, the exhaust reaches the air quietly instead of with a rush and noise.

The first mufflers, while they did quiet the exhaust, often caused great loss of power on account of back pressure. Because of this a cutout was devised, namely, a valve which permitted an exhaust direct into the air. The annoying effects of the cutout caused manufacturers to turn their attention to the development of the muffler.

The cutout is no longer furnished as a part of regular equipment because there is now no back pressure, although it is not impossible, for small openings in the muffler will clog with carbon soot from the exhaust if the muffler is not kept clean. Many times this is so severe that the engine is stopped or most of its power is lost.

Poor grades of gasoline have a tendency to give off more carbon than better grades. Particularly is this true if the carbureter is out of adjustment, as an excess of gasoline will be permitted to enter the cylinders. It is not properly burned and the extra carbon causes the muffler to clog.

Clogging of muffler holes and back pressure or unescaped gas prevent the cylinders from being emptied of burned gases; this prevents drawing in a full charge of mixture on the intake stroke, the explosion is weak, and the power lessened.

The muffler is seldom thought of when

## LEGAL NOTICE.

Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of August 24, 1912.

of The American Garage & Auto Dealer, published monthly at Chicago, Ill., for October 1, 1920.

State of Illinois, County of Cook, ss.—Before me, a notary public in and for the state and county aforesaid, personally appeared S. R. Edwards, who, having been duly sworn according to law, deposes and says that he is the editor of The American Garage & Auto Dealer, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 448, Postal Laws and Regulations, printed on the reverse of this form to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:

Publisher—American Garage & Auto Dealer, Inc., 116 S. Michigan Ave., Chicago, Ill.  
Editor—S. R. Edwards, 116 S. Michigan Ave., Chicago, Ill.

Managing Editor—S. R. Edwards, 116 S. Michigan Ave., Chicago, Ill.  
Business Manager—J. R. Hastie, 116 S. Michigan Ave., Chicago, Ill.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock): H. D. Fargo, 116 S. Michigan Ave., Chicago; J. R. Hastie, 116 S. Michigan Ave., Chicago; S. R. Edwards, 116 S. Michigan Ave., Chicago; I. B. Lipson, Fort Dearborn Bldg., Chicago; J. W. Hastie, 26 S. Hamilton Ave., Chicago; E. C. Hole, 431 S. Dearborn St., Chicago; S. G. Levy, Fort Dearborn Bldg., Chicago; E. T. Clissold, 327 S. La Salle St., Chicago; R. S. Clissold, 327 S. La Salle St., Chicago.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: (If there are none, so state.)—None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is: (This information is required from daily publications only.)

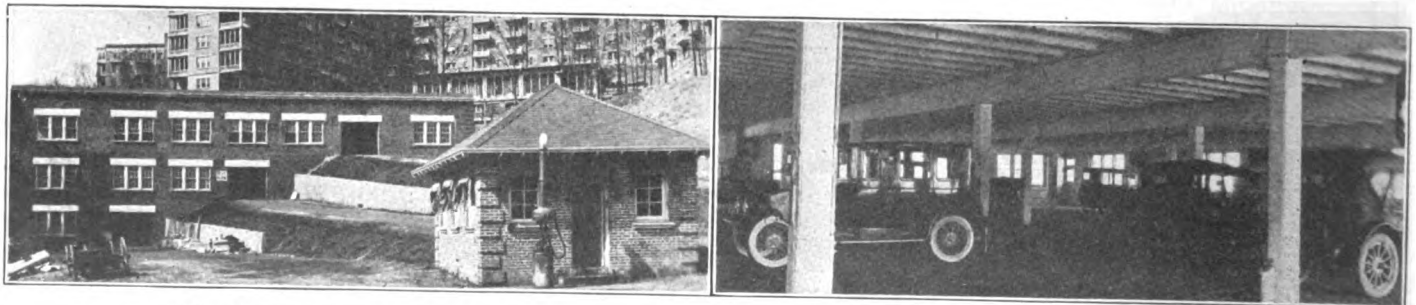
S. R. EDWARDS,  
Editor.

Sworn to and subscribed before me this 27th day of September, 1920.

(Seal.) E. V. CROSS,  
(My commission expires Oct. 24, 1920.)

## Storage Batteries Explained by Moving Picture Films.

The mysteries and uncertainties of storage batteries used in automobiles for start-



The Spacious Interior of the Wardman Park Inn Garage is As Attractive and Neat As the Exterior.

is included. Two extra ramps lead to the second and third floors doing away with elevators and allowing considerable extra room for space and storage.


The neat filling station in front is to be noted. Built of red tapestry brick with white trimmings, the garage presents an attractive appearance.

there is a sudden decrease of power. When kerosene is used in the cylinders to get rid of carbon, carbon will likely be transferred from cylinder to muffler unless the cutout is opened, when the engine is running, to blow out the carbon and kerosene. The mixture is apt to plaster over the walls of the muffler and bake into enamel.

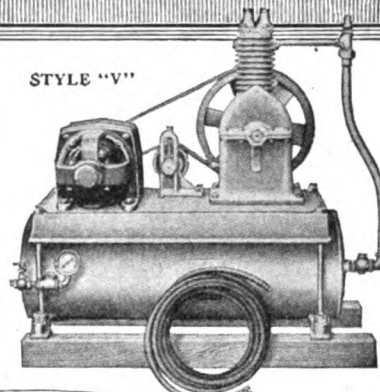
ing, lighting, and ignition are explained by a moving picture film which is being shown. This film shows the construction and functioning of an electric storage battery under normal use and while being abused.

There are 3,000 feet of the film and the functioning of the battery is pictured by sketches.




**FREE  
CURTIS AIR  
FREE FROM OIL**

STYLE "V"



## THIS SIGN

Displayed by progressive garages and service stations will bring you new customers and hold old ones. It stands for pure, clean air, free from oil. Motorists know that oil-soaked air ruins tires, and are on the lookout for this sign. When you furnish Curtis Air you give real service.

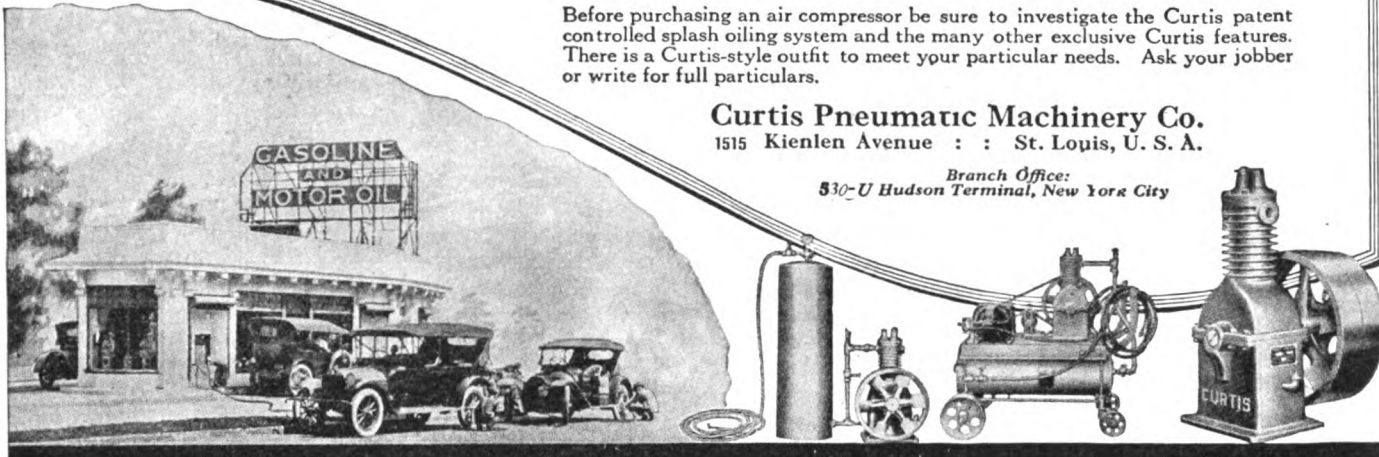
# CURTIS AIR

## FREE FROM OIL

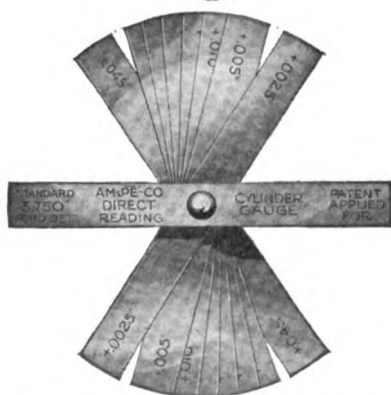
Before purchasing an air compressor be sure to investigate the Curtis patent controlled splash oiling system and the many other exclusive Curtis features. There is a Curtis-style outfit to meet your particular needs. Ask your jobber or write for full particulars.

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# Nothing like this tool for measuring the size of cylinders



# Accessories—Dealers' Key to Profits

## New Era Bumpers Are Strong, Durable and Pleasingly Neat.

Are you familiar with the New Era "Better" spring bumper? If you are you know all about its strength, durability and its many unusual features. If you are not, you will find much of interest and value in a description of this accessory.

The reason for using springs on anything is to take care of recoil and soften the impact. The New Era spring bumper, manufactured by the New Era Spring & Specialty Co., is made to operate on the same principle. Double bars of tempered spring steel, one inch apart and tied in the center with three-inch plates afford the greatest possible strength combined with firm resiliency. In any ordinary collision there is a drum-like rebound which injures neither the car nor bumper. This feature is found only in the New Era bumper, states its manufacturer.

There are no weak points the whole length. When an angle blow is received, the shock is distributed throughout the entire length of the bumper and attaching arms.

As the main bars are of highly-tempered spring steel and the short detachable arms are only semi-tempered, these will bend if any severe shock is received, causing but little, if any, damage. They are easily straightened or are replaced free.

Patented adjustable hook-on attachments are easily and quickly fitted to 95 per cent of the different models of cars on fronts and some rears. Owing to the many different rear frame and spring constructions, special attaching arms are required in a number of cases. Plenty of room is allowed for the tire carriers.

New Era bumpers are finished in black enamel or with a nickel front bar. A special process of zinc-nickel plating protected

New Era Spring & Specialty Co., 56 Cottage Grove Ave., Grand Rapids, Mich. Mention the American Garage & Auto Dealer when writing.

## Less Work Made Possible by New Cleansing Preparation.

Meno means less work, and that is what Peter A. Frasse & Co. were making possible when they invented their new "Meno" rust remover and cleanser which has recently made its appearance on the market.

Meno is a scientific combination and blending of certain chemical ingredients, which in combination produce an electro-chemical action that rapidly loosens and dissolves rust, corrosion, grease, oil, dirt carbon, paint, or any other foreign substance that is adhering to the metal—irrespective of its age or hardness, and its action automatically ceases when contact between the cleanser and the metal is established, and this is as far as it will go, says the manufacturer, for it will not injure or mar the surface of the metal itself in any way.

The preparation will not explode or burn, it is claimed. Another important point in its favor is that it will not cause corrosion or rust to form, for in fact, it protects the metal and makes it exempt from corrosive or disintegrating action for a long period after it has been treated by this preparation.

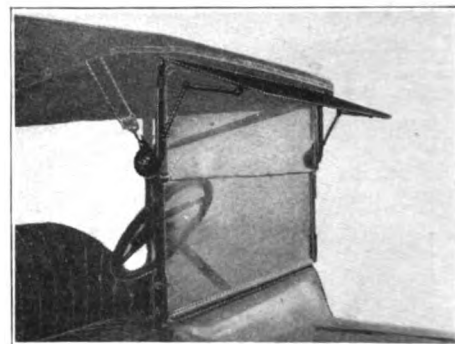
For further information write to Peter A. Frasse & Co., 417 Canal St., New York City. Mention the American Garage & Auto Dealer when writing.

## A True Comfort Accessory—A Ford Storm and Sun Shade.

A company has recently been formed for the purpose of manufacturing and distrib-

ut windshield of the Ford runabout and touring car has a two-piece construction with a stationary bottom section and a top section that can be turned down, it was necessary to devise some means of holding the shade in place to give the desired results when the driver wanted to open the top of the windshield to secure ventilation.

This difficulty was overcome by an in-



The Storm Shade Is Adjustable from the Driver's Seat.

genious device which supplies the necessary sub-frame without the necessity of altering the present windshield in any way, and which holds the shade in place whether the windshield is open or closed, or the top is up or down.

The shade is 10 inches wide, affording sufficient projection in front of the windshield at any angle to protect the driver and passengers.

If the sun is low, it protects the eyes from glare. If it is raining or snowing, the shade is adjusted to that angle necessary to offset the angle of the storm and a clear strip on the windshield through which the driver can have a clear vision of the road is preserved.

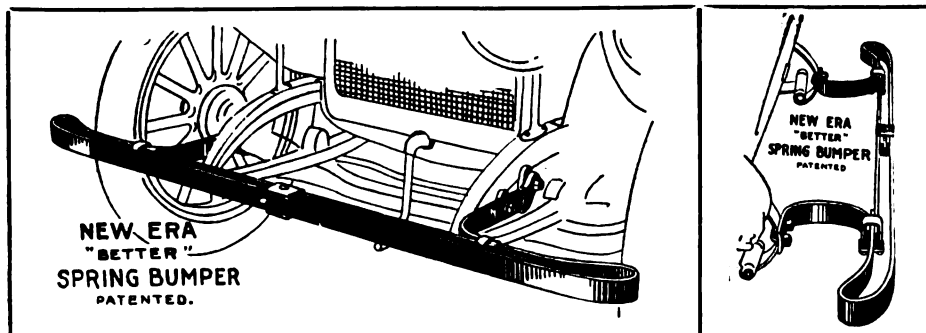
An important feature is that the London shade is adjustable from the driver's seat to any angle to suit the comfort, convenience and safety of the driver and other occupants of the car.

Dealers can obtain further information by writing to London, Inc., manufacturers and distributors of automotive specialties, 1303 West Lake St., Minneapolis, Minn.

## Make the Dollars Go Farther—Let Nokorode Do the Work.

What do you use in your shop—soldering acid or soldering salts?

If you are using soldering acid, you have never heard about Nokorode salts, states the M. W. Dunton Co., its manufacturer, for one pound of Nokorode salts cut with eight parts of water will make one gallon of the best soldering flux on the market. When used it will leave the metal bright and shiny; it will not burn the operator's hands or clothing, and while under heat it



New Era Bumpers Have All of the Required as Well as a Number of Distinctive and Advantageous Features.

by special rust and tarnish-proof lacquer will maintain a bright finish.

The black or nickel bumpers are 100 per cent interchangeable with all arms or fittings.

For more complete particulars write the

uting London's adjustable storm and sun shade which has been especially designed for Ford runabouts and touring cars.

The aim of the company is to place on the market a storm and sun shade which will be of service in all seasons. As the

Non Drying



Non Freezing

# GRINDING COMPOUND

## Better Ground Valves In Half the Time

Water-mixed "PEP" does the work better than any oil-mixed compound. Water being thinner than oil distributes the abrasive freely and evenly. The finish produced is of that microscopic fuzziness peculiar to the perfectly ground surface.

"PEP" never leaves rings on the valve face and seat. When oil is used, the coarser particles of the abrasive, traveling in ruts, form grooves and rings that are often visible to the eye—even after the "finish" is applied.

You have probably been using an oil-mixed abrasive as a matter of habit. It's a bad habit, as you will realize when you have tried "PEP" and compared results. Lubrication is all right in its place, but you do not want lubrication for grinding valves.

"PEP" is economical from every standpoint, and is saving money in the thousands of shops where it is now in use.

**One grade starts and finishes the job in one operation.** There is no waste of material—no expensive containers necessary. The valve is seated in half the time ordinarily required.

There is only one operation because you use only **one grade** of abrasive, which combines the cutting and finishing grades of other compounds. The low viscosity of water allows the particles of abrasive perfect freedom of movement, resulting in increased friction that finishes the job in one-half the time required with sluggish, oil-mixed compounds.

"PEP" is convenient to use. No dry or cracked hands from using gasoline or kerosene. Only a water dampened cloth is required to wipe the valves before and after grinding with "PEP".

A perfect valve grinding compound requires a non-lubricating binder. "PEP" meets this requirement and increases profits by the time and material it saves.

A test will prove our claims and you are invited to try "PEP" at our expense. Send in the coupon today.

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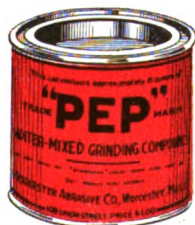
**WITH YOUR JOBBER'S O. K.  
ON THIS COUPON WE WILL  
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OF PEP (Value \$1.00 List) FREE**

# FREE

Your Jobber wants to sell you the best Grinding Compound, but he is too busy to make a test of every brand. To prove the superiority of "PEP" we are willing to go to the expense of sending you free a half pound can (value \$1.00 list) under the following conditions. Clip this coupon and send it to your Jobber with request that he O. K. and forward to us. Also with the understanding that you will report to him the success of your test of "PEP".

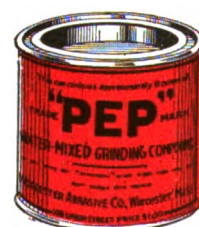
(YOUR JOBBER'S O. K. NECESSARY)  
(To Your Jobber):

Gentlemen:—We would like to make a test of PEP in accordance with their proposition. Kindly O. K. and forward this coupon to the Worcester Abrasive Co. so that they will send us a half-pound can of PEP (value \$1.00 list) for testing purposes. I will let you know the results of this test.



**JOBBER'S O. K.**

Please send the party whose name is written above, a half-pound trial can of "PEP."



1662-1664 Broadway **WORCESTER ABRASIVE CO.**

New York

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



never has disagreeable fumes. It makes the solder stick to the work and insures perfect lasting non-corrosive joints.

Sal ammoniac is commonly used as a dip to keep the soldering iron bright and well-tinned and, as is generally known, sal ammoniac causes corrosion. Nokorode salts will not only tin the iron, but will keep them cleaner and the tinning will not burn off as readily as when sal ammoniac is used.

When it is considered that four barrels of Nokorode salts are said to do the work of two carloads of acid it will be appreciated how Nokorode insures economy in soldering and does away with the inconvenience of handling bulky or leaky containers.

The United States government has endorsed Nokorode salts as have a number of representative concerns.

Dealers will find a big market for the Nokorode soldering kit which the M. W. Dunton Co. is producing, for these kits contain everything needed to do the right kind of a soldering job quickly and easily. They are just the thing for the motorist to carry in his tool box, and they are equally valuable in every garage and in the home. In fact, their uses are too numerous to go into further detail.

The manufacturer is conducting an educational campaign of far-reaching trade possibilities through trade mediums.

Men, women and children are being taught to go to their local dealer for Nokorode and Nokorode solder kits. The company's offer of \$25 cash to boys making the most novel and practical soldered toy attracts wide attention when displayed on an attractive placard in a well-planned window, and brings in the trade.

Write today to the M. W. Dunton Co., Providence, R. I., for interesting literature and more complete details concerning Nokorode and the Nokorode soldering kit. Mention the American Garage & Auto Dealer when writing.

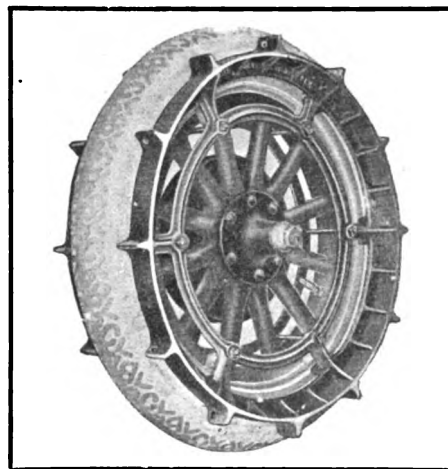
### Foley Adds Traction Rim for Pneumatic Tired Trucks.

Owing to the growing popularity of pneumatic tire equipment for trucks, the Foley Traction Rim Co. has been working on a traction rim to cover this field. After every conceivable test had been made, a pneumatic traction rim for one-ton trucks using 30-inch or 32-inch size pneumatic tires (such as the Ford one-ton truck) was put on the market.

The action of Foley traction rims for both solid and pneumatic tired wheels is automatic, simple and practical. On hard roads, they do not come into action at all as the rubber tires are then amply sufficient for traction. However, as soon as soft roads are reached and the tire sinks into the ground, the traction rim comes into use. Its extra surface bearing, which prevents sinking, together with the many traction lugs take hold so firmly that the drive wheels cannot spin.

In case of a puncture or a blowout, a pneumatic-tired truck equipped with Foley rims could be driven without danger to casing or tube. Foley rims on pneumatic-tired trucks protect the side wall of the tires from tearing when operating in rutty road conditions.

Foley traction rims are said to be made of the best quality electric steel castings. They are made in two styles, a split rim for the inside of the wheel and a solid rim for the outside. This dispenses with remov-



On Soft Roads, the Traction Rim Gets Into Action.

ing the wheel to make application of inside rim.

General information and literature will be furnished to interested parties by the Foley Traction Rim Co., 827 Hennepin Ave., Minneapolis, Minn. Be sure to mention the American Garage & Auto Dealer when writing for further particulars.

### Prince Mfg. Co. Gives Good Reasons for Ordering Bracefords.

The Prince Mfg. Co. gives six mighty good reasons why orders should be sent in for the Ford braces which they have placed on the market. The "Bracefords" as they are called, are said to:

1. Stop the shake and the destruction which goes with it.
2. Save fenders. One fender costs more than a set of Bracefords.
3. Stop running-board sag and fender flapping.
4. There are strap slots in feet and body to fasten anything to the running boards, such as suit cases, trunks and other luggage.
5. Save the entire side of car in a collision.
6. Strengthen the weakest part—stabilize the entire car, preserve its appearance, and make resale value higher.

The Braceford comes in a set of four with bolts ready to attach. This is a live article for dealers.

Write for further particulars and literature today to the Prince Mfg. Co., 6 Liberty Court, Sumter, S. C. Mention the American Garage & Auto Dealer when you write.

### White Stripe Embodies a New Idea in Fan Belt Construction.

After two years of experimental work, the Advance Automobile Accessories Corp. has perfected a new idea in fan belt construction. The fan belt has recently been put on the market under the name White Stripe Cord and the belt itself is marked with a white stripe, the same trade mark that is used on the White Stripe transmission lining made by the Advance Automobile Accessories Corp.

The white stripe cord is a belt of two distinct parts. This principle of construction is said to make the belt distinctive from any other belt and, according to the manufacturer, insures its wear at least a year on any car under any condition.

The core or load-carrying center of the belt is made of a very strong rim tire fabric and live rubber and is then strengthened by an endless cord that encircles the belt five times. The load-carrying center will not break under 500 pounds' weight. The whole center is protected by a cover, made of rim tire fabric, built slack around the core so that it will not carry any load.

It is so processed that it has remarkable gripping power and will not slip on the pulley. The treatment, it is stated, is not affected by the heat, oil, water, grit and grime to which fan belts are exposed. This means extra long life for the belt. The combination makes a belt that is very flexible, one that always hugs the pulley and never needs adjustment. These fan belts



"White Stripe Cord" Is Put Up In Attractive Display Cartons.

come packed one dozen in a box in very attractive red, black and white counter display cartons.

The Advance Automobile Accessories Corp. at 1603 S. Michigan Blvd., Chicago, Ill., will be glad to send further details and trade prices to those desiring it. Mention the American Garage & Auto Dealer when writing.

### Paragraph.

THE PARKER MOTOR TRUCK Co., Milwaukee, Wis., announces that its new sat-alog with interesting truck features is ready for distribution.





## The EN-AR-CO Boy and Slate Sign Makes Good

*This is the boy that  
makes sales for  
you all*

This is the En-ar-co Boy and Slate sign.

He's the talk of motordom.

You'll find him in front of garages, auto supply houses, drug stores, everywhere where En-ar-co oils, motor oils, gear greases, National light oil and White Rose gasoline are sold.

They all stop to read the witty, funny, clever sayings chalked on his big slate.

We furnish you the sign complete (it stands over six feet high) and new sayings to chalk on the slate, supplying new copy for every other day.

It is the biggest and best advertising novelty ever devised.

The newspapers have taken it up. The sayings of the En-ar-co Boy and Slate sign are quoted. Everyone is giggling over them.

### *Write to Us Today*

Write to us TODAY for this service. You will be amazed how it helps draw business. People can't miss seeing this sign, and when they see him they just have to stop and read. Get in line at once.

**THE NATIONAL REFINING COMPANY**  
2188 Rose Building, Cleveland, Ohio

**The National Refining Company,**  
2188 Rose Building, Cleveland, Ohio

Please send me full detailed information as to your Boy and Slate and other En-ar-co advertising helps.

Name .....

Address .....

City..... State.....

I now sell.....oil.

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

# Up-to-the-Minute Garage Equipment

## Globe Mfg. Co. Places in Production Its Super-Stage Compressor.

During the past 12 or 15 months the engineers of the Globe Mfg. Co. have been perfecting a new type Super two-stage air compressor.

The important outstanding feature of this new product is that it is a two-stage compressor having but a single light-weight piston, only one cylinder, one connecting-rod and no stuffing boxes. Therefore, the reciprocating parts are no heavier than the corresponding parts of a single-stage compressor of the same dimensions, this permitting the Super two-stage to be driven at as high speed as is possible with any single-stage compressor of equal dimensions.

The greatly increased efficiency and the greater displacement resulting from the higher speed at which it may be driven are most favorable features.

In proportion to the load carried, the construction of the crankshaft and connecting-rod and all of the bearings on the Super two-stage compressor are guaranteed by the manufacturer to insure great durability, combined with freedom from care and upkeep expense.

With the exception of the flywheel, every moving part is entirely enclosed and there-

fore protected against dust, dirt, or grit and against damage from any external source.

In connection with the internal mechanism, there are no nuts, screws or other detachable parts which can work loose and cause damage.

The entire top of the crankcase is removable; the line of separation being in line with the center of the crankshaft bearings. The removable, bronze-back, babbitt-lined, laminated-shim bearings being entirely self-contained, are not in the least disturbed by removal of the crankcase cover, which affords most convenient access to every bearing without the slightest interference with any other part.

If through carelessness, or by any accident, the piston or cylinder should be damaged beyond repair, either can be replaced without the necessity of scrapping any other part. The same is true of all valves, bearings, connecting-rods, the crankshaft, in fact all parts.

Vertical tappet valves are used throughout, and all of the parts of each valve are arranged in a complete self-contained assembly so designed that all wear is confined to the various parts of the assembly any part of which or the complete assembly may be renewed any number of times.

If for any reason it should become necessary to remove the piston, it can be done without the least disturbance of any of the valves or any of the air connections, and without disturbing any of the bearings except the wrist-pin bearing of the connecting-rod.

Lubrication, which is wholly automatic, is secured by means of a specially controlled splash system.

The flywheel is provided with nine fan blades, so arranged that when the compressor is in operation, the entire machine is constantly bathed by a strong current of air.

The muffler, which is attached to the intake valve, is provided with an air filter for the purpose of removing dust and all other objectionable matter before the air enters the low pressure cylinder, from which it is forced through the flanged inter-cooler into the high pressure cylinder. This produces the first stage compression which does not exceed 55 pounds.

The second stage, or final compression, is produced by the return stroke of the piston, which forces the air from the high pressure cylinder into the storage tank, first passing in through the flanged condensing chamber or purifier, beneath the crankcase where it is freed from moisture and any traces of oil, thus insuring a supply of purified air, free from dust, oil, surplus moistures or any other contamination.

Each machine is equipped with the latest type Globe automatic pressure unloader.

At present, the Super two-stage compressors are built in three sizes ranging in capacity or actual piston displacement from three to 25 cubic feet of free air per minute.

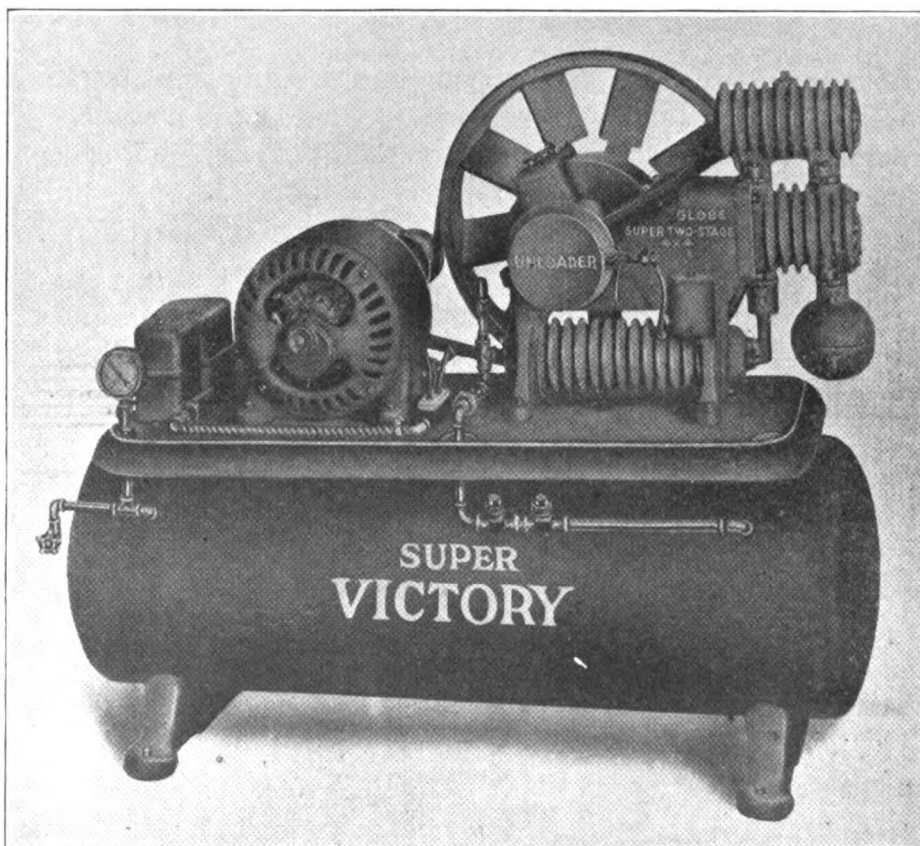
All sizes are designed for inflating giant pneumatic tires, or any other service within the limits of their capacity and requiring pressure up to 350 pounds to the square inch.

Write to the Globe Mfg. Co., Battle Creek, Mich., for more complete particulars. Mention the American Garage & Auto Dealer when writing.

## Quality Electrical Products Co. Announces Sturdy Growler.

For over 25 years the growler has been used in one form or another for detecting armature faults. It has gone through a long succession of improvement and now the Quality Electrical Products Co. claims that its automatic growler is in a class by itself and meets every requirement for getting satisfactory readings.

The machine gives tests under operating conditions. Short-circuits and grounds in coils, leaks due to moisture and charred insulation; commutator trouble, loose leads



Super Victory Compressors Will Meet With Popular Favor.



**Harvey**  
**RACINE**

**BOLTLESS  
AUTOMOBILE  
SPRINGS**

*An Arch is as strong as its keystone  
A Spring as strong as its center.*

**Harvey Springs  
are Boltless**

**DEALERS—**  
Write for our book  
listing over 1500  
kinds of Harvey  
Springs and for de-  
tails of Harvey ad-  
vertising helps.

**T**HE ordinary spring, weakened by a hole in its center, punched cold to accommodate a bolt, is like an arch with a weak keystone. The vital spot lacks strength.

The Harvey Spring is boltless and has no weak spots. It is as strong at the center as at any other point. Instead of a bolt hole at the center each leaf has an indentation on one side and a bead on the other, forged hot in one operation. The bead of one leaf fits into the indentation of the next leaf and the whole spring is held together by a strong clamp. No metal is removed and the steel fibres are unbroken.

This feature, with that of the patented Harvey process of heat treating and tempering, gives the Harvey unexcelled strength and resilience. It adds safety and comfort to the motor car and lengthens the life of the driving mechanism.

The Harvey Spring is practically unbreakable, even under unreasonable strains. Once sold it *stays sold*.

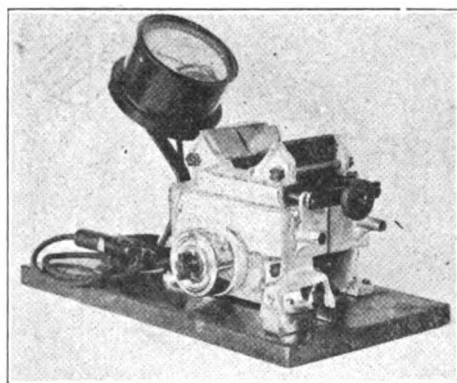
Our broad, unconditional guarantee protects both the dealer and the purchaser.

**Harvey Spring & Forging Co.**  
104B Seventeenth St. Racine, Wis.

**GUARANTEED****EASY RIDING**

and other troubles are claimed to be quickly and accurately located.

In presenting this device to the trade, the company states that it is offering a device that uses in addition and in conjunc-



Something New in an Automatic Growler.

tion with the growler that is incorporated, six distinct features which are not found in any other growler.

There is a specially wound low-reading alternating current ammeter, which gives a full scale reading of  $2\frac{1}{2}$  amperes alternating current. Due to special winding, this ammeter will stand as high as 15 amperes without damage.

An automatic switch which automatically closes the circuit when the armature or field coils are placed on it for testing and again opens the circuit when they are taken off, is a special feature which prevents the

burning out of coils left on the circuit accidentally, eliminates fire hazards, and acts as a current-saving device.

By use of a series-parallel switch the instrument is made instantly adaptable to either starting the motor or generator armatures, likewise series or shunt field coils.

Another feature is the testing bug, which is sensitive and accurate in detecting faults—an easily-handled, time-saving device.

The sixth special feature is the hand piece used to connect the ammeter to the commutator bars. This is of special design made as simple as possible and yet at the same time convenient and durable. This has been accomplished by eliminating all springs, screws and complicated parts from its construction.

The Quality-Automatic Growler is one of the most needed and one of the most practical instruments for the repair shop. It enables the mechanic to know why an armature is condemned and why a new one should be installed.

For trade prices and more complete details write to the Quality Electrical Products Co., 907 East 15th St., Kansas City, Mo. Mention the American Garage & Auto Dealer when writing.

### Light Up Santa Claus' Way Says the Federal Electric Co.

With winter gradually coming on it requires little effort to imagine a street filled with men, women and children wrapped in furs and heavy overcoats, their breath

freezing, all carrying bundles, hurrying to and fro to purchase Christmas gifts.

Christmas shopping differs from general shopping in that it is not confined chiefly to women. The fact that the things bought are to be gifts—pleasant surprises for friends or relatives—makes it imperative for men as well as women to shop.

Most men are employed during the day and have little time to shop except during evenings. In order to accommodate them, most stores remain open several weeks before Christmas.

Christmas has always been a period of good cheer. Our aim is to make others happy. Our psychological make-up is such that we associate cheer with light and brightness. Places for merry-making are brilliantly lighted. We always have more courage and cheer on a bright morning when the sun has risen than after the sun has set.

If there is not an attractive electric sign in front of your place of business now, you are losing the advertising value that an electric sign could give you, states the Federal Electric Co. This may mean the loss of many dollars in potential profits. An electric sign would draw to your store the Christmas crowds bent on purchasing goods. They would be attracted to it by the brilliancy of the illuminated sign.

The blue and white porcelain enameled steel signs manufactured by the company, can be seen equally well day or night. They are visible at a considerable distance from a place of business—for several blocks on either side of it—and will attract the attention of hundreds of persons. The sign also serves to identify a business place—it acts as a guide post. It is not uncommon for persons in giving directions for finding a place to advise to "look for the sign."

Porcelain blue and white enameled steel signs do not fade and they last indefinitely. When they are soiled, they may be made clean by merely washing with soap and water.

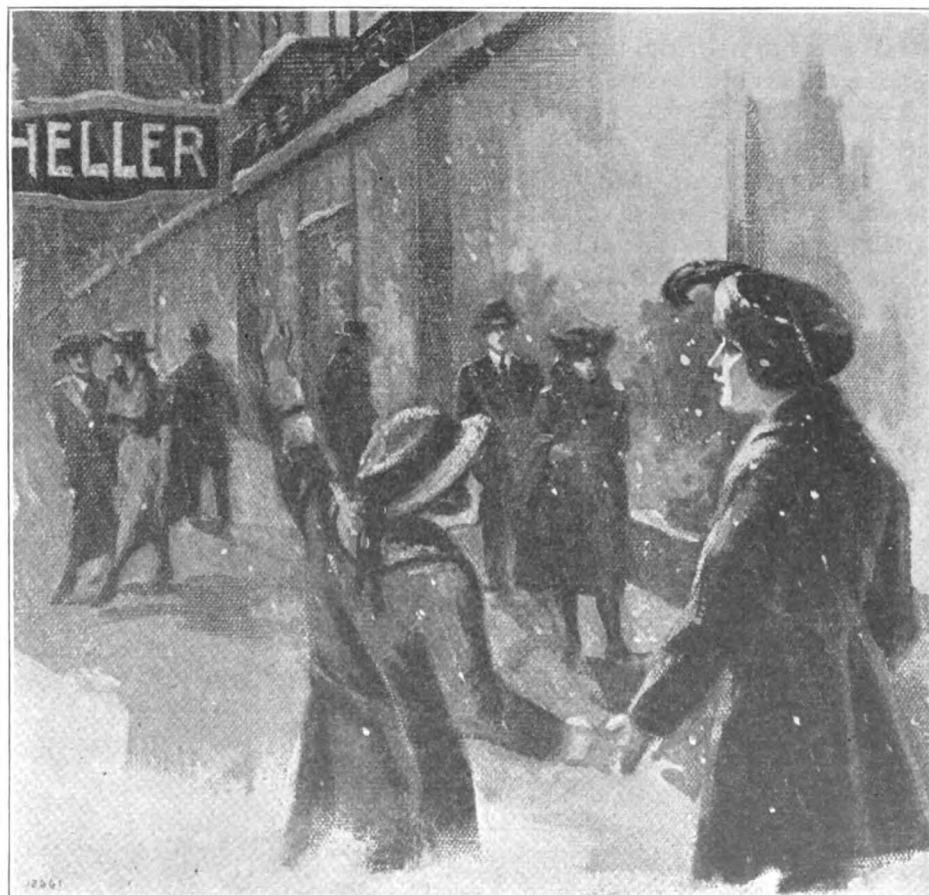
Write to the Federal Electric Co., 8700 S. State St., Chicago, and find how to add to the Christmas cheer. Mention the American Garage & Auto Dealer when writing.

### Tire Conservation and Wheel Alignment Indicator Join Hands.

One of the greatest items of expense in the upkeep of a car whether it is a roadster or truck, lies in the tires.

When wheels are parallel, the wear on tires is at a minimum since the wheels simply roll along the road or pavement with no friction. Any deviation from the parallelism develops a side thrust or "drag" on the tires that is very destructive especially when driving over pavement or hard surface roads.

If the front wheels of a car are out of true alignment one inch, it naturally follows that the tires must be dragged sideways three inches in every revolution. Fig-



The Brilliancy of an Electric Sign Draws the Busy Shopper's Trade.





## There is a better way to keep the store records you need

Every merchant can get the figures for his Income Tax report without working overtime on day book, pass books, ledgers, and memorandums.



He need not trust to his memory for the figures. He need not guess.

An up-to-date National Cash Register will give him a record of every store transaction—automatically and accurately.

He will have control of his business. He will be able quickly to make out an Income Tax report that will be acceptable to the government.

We make cash registers for every line of business. Priced \$75 and up.

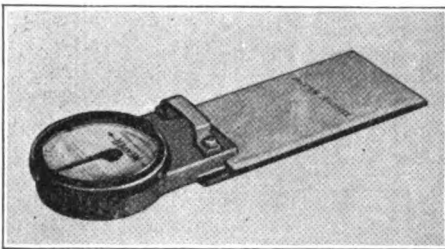
# NATIONAL

## CASH REGISTER CO.

DAYTON, OHIO.

uring upon this basis, a 30-inch tire would be dragged sideways 168 feet in every mile that the car is driven.

As statistics show that from 50 to 75 per cent of the cars being driven today have



Stationary Type of Alignment Indicator.

their wheels out of alignment to a greater or lesser degree, it is not so difficult to understand what is causing the enormous consumption of tires and it is also easy to understand that by properly aligning the wheels, millions of dollars could be saved the motoring public each year.

Many methods are said to have been employed in checking up the mis-alignment of wheels. It seems reasonable to expect, states the Weaver Mfg. Co., that the introduction of an instrument which will accurately record the mis-alignment of the wheels, to the minutest fraction of an inch, by simply driving one wheel of the car over it, will do much to eliminate this enormous tire waste in the future.

Therefore, the company is introducing the Weaver wheel alignment indicator, the principle of which is simple in the extreme. The instrument consists only of the two flat steel plates with roller bearings between, the upper plate being accurately connected with a recording mechanism which registers the movement of the plate on the dial.

The advent of this device makes it possible to run the car slowly over the plate of this instrument and tell by a glance at the dial any mis-alignment of the wheels.

The company is manufacturing its wheel alignment indicator in two sizes. The larger or stationary type is designed for installing in the runway of the garage so that cars, going in or out, will pass over it. This type is equipped with an electric bell which rings if the wheels are out of alignment more than the minimum degree which the garageman chooses to establish. The smaller or portable type is designed for use in the shop for aligning the wheels after the stationary instrument has shown that the wheels need attention.

The Weaver Manufacturing Co. is featuring this instrument at its exhibit at the Automotive Equipment Show held at the Chicago Coliseum, Nov. 15 to 20. The factory is located at Springfield, Ill.

### Tokheim Lays Stress on the Value of Visible Dispensing.

The plant of the Tokheim Oil Tank & Pump Co., at Fort Wayne, Ind., has undergone continual and progressive enlarge-

ments since it was first started until it now covers more than a quarter of a city block and buildings are under way which will make it a great industry of Fort Wayne.

The new Victory Visible No. 200 pump

cannot be opened while the pump is operating, as the opening of the discharge valve automatically closes the inlet and shuts off the pump. This protects the seller of gasoline from carelessness or the mistaken generosity of clerks.

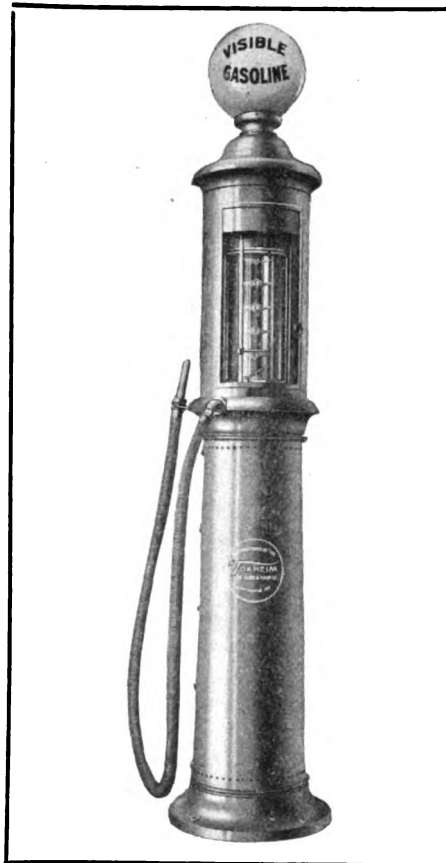
Closing the revolving doors, opens the outlet to the underground storage, permitting any gasoline remaining in the measuring bowl at the close of a day's business to drain back. The meter automatically disconnects the instant the drain valve opens, insuring the owner of the pump that only the gas that actually flows in the customer's car is metered.

The drain valve to the underground storage cannot be opened until the outlet valve to the car is closed and the revolving doors of the pump closed and locked shut.

Complete discharge of all the liquid contained in the hose is insured by a vacuum breaker which is always open.

This method of dispensing gasoline insures to the customer a full measure of solid gasoline, which he sees as it stands still in the glass measure.

For more complete details concerning the Victory Visible No. 200 pump, write to the Tokheim Oil Tank & Pump Co., Fort Wayne, Ind.



Every Customer Sees the Gasoline That Goes Into the Tank.

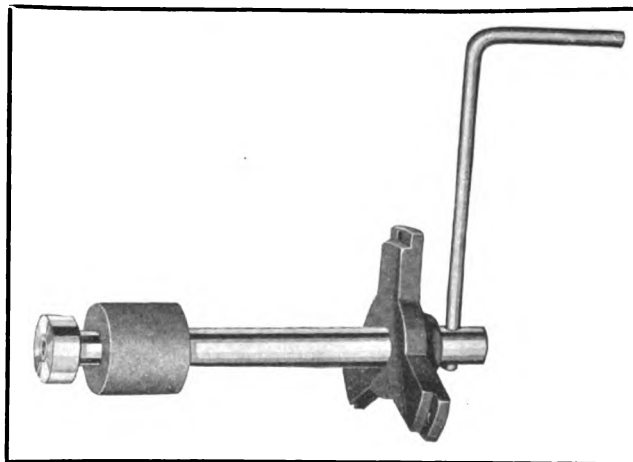
which is being manufactured there, has been given approval by the Underwriter's Laboratory, Inc. For this product the company makes the following claims:

The pump cannot be operated unless and until the revolving steel doors are locked wide open. There is a 14-inch opening both front and back, permitting the customer to

### The Ford Generator Brush Sander Is a Real Efficiency Tool.

When dirt accumulates on the brushes of the Ford starting and lighting generators, contact becomes poor and loss of power results.

The Hinckley-Myers Co.'s Ford generator brush sander affords a quick and easy method of cleaning and polishing these brushes, and this device is distinctly new. The shaft of this fixture is accurately centered by three-lub countersunk end piece, which fits the generator case and the removable disk at the sander end. The emery cloth is supported on the sanding wheel with a diagonal grain and can be



No More Loss of Power from Dirty Generator Brushes — The New Generator Brush Sander Cleans and Polishes Them.

see through the cylindrical glass tank from either side as it is filling and discharging. The interior is so illuminated by an electric bulb that the customer is equally protected by night or day.

The outlet valve to a customer's car

removed and replaced when worn. The shipping weight is six pounds.

For more detailed information and trade prices write to the Hinckley-Myers Co., 6 N. Michigan Ave., Chicago. Mention the American Garage & Auto Dealer.

# NEW ERA

## "Better" SPRING BUMPERS

New Era Spring Bumpers are practically indestructible—so much so that we will replace free of charge any New Era that is damaged regardless of how this damage occurred—whether the car owner's fault or not.

This paid up bumper accident insurance policy with each New Era is the strongest guarantee ever offered an accessory and is a real "closer" in selling New Eras.

It is good business to stock and sell New Eras—the bumper with the recoil that eases up the shock of collision—the bumper of double bar and double strength, tied at both ends and re-enforced at the center. 100% interchangeable—if you can't sell New Eras for Ford or Overland they may be exchanged for Essex or Hudson, for instance—no dead stock.

One price, one quality, and dealer policy. Sell New Eras front and rear—okeyed by the Underwriters' Laboratories, Inc. Immediate shipments.

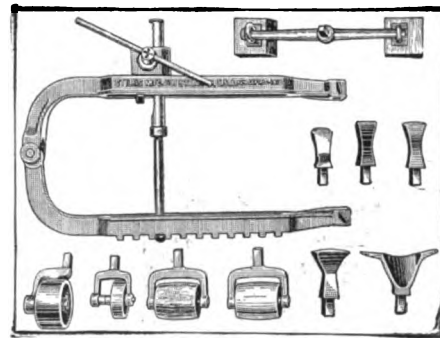


Send for Catalog

**NEW ERA**  
**Spring and Specialty Co.**

56 Cottage Grove Ave.  
Grand Rapids, Mich.

List Prices:  
(Fords) black \$12.50, nickel \$14.00  
Other cars " \$13.50, " \$15.00



## There Is Money for You in Those Bent Fenders

Every car gets its fenders bent, twisted, or dented at some time or other. In many cases the owner does not bother to have them straightened because he does not know where he can get it done at a moderate price, and without having to leave his car. Here's where you come in.

### Install a STILES ROLLS-EM-OUT FENDER STRAIGHTENER

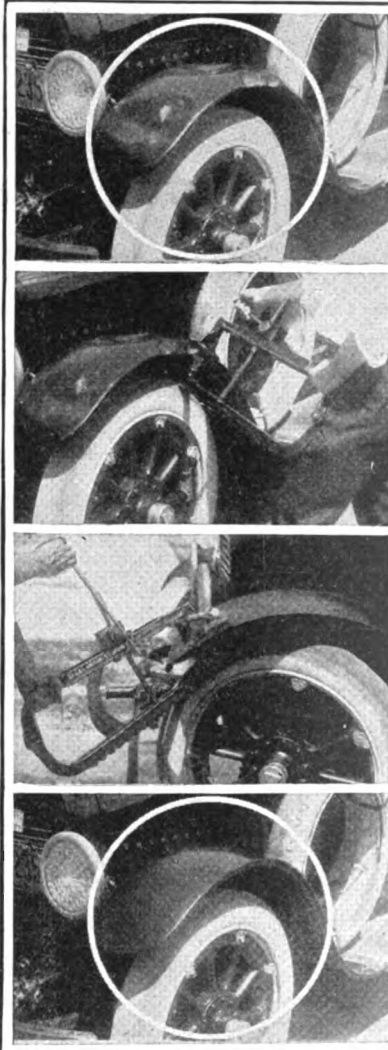
As soon as you have done a few jobs with it, the car owners will pass the word along and a new stream of profitable business will come your way.

The Stiles Rolls-Em-Out Fender Straightener operates on the same principle as the well-known arbor press. It effectually presses out bent and dented fenders and restores them to normal shape without marring the enamel or finish if not previously injured.

It is operated by one man. Any shop man can do satisfactory work with it—no high grade mechanic or any particular skill or experience is required. Illustrated instructions with each outfit make any repairman an expert.

The Stiles Fender Straightener does away with the old method of hand peening and bumping—and does better work in a fraction of the time.

There is probably enough work for this tool in your shop right now to more than pay for it.



Price of outfit, complete.....\$40.00

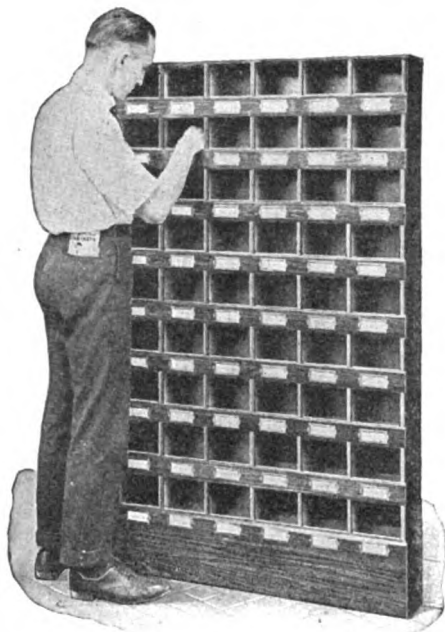
Order from your jobber or write us direct.

**STILES MANUFACTURING COMPANY**  
St. Louis, U. S. A.

**STILES ROLLS-EM-OUT  
FENDER STRAIGHTENER**

### You Can Easily Find the Part You Want in This Stock Case.

Here is a new convenient size stock case for holding miscellaneous stock and parts, so that they can be quickly and readily found. This 54-compartment stock and



**New Compartment Stock and Accessory Bin.** accessory bin is a new product of Hobart Brothers Co., Troy, Ohio.

It is sturdy, built of oak and steel to withstand excessive weights and each compartment has a card holder describing its contents. The compartments are 6 ins. wide, 6 ins. high and 8 ins. deep.

The case can be used sectionally and additional units can be furnished. Full information regarding the case will be sent upon request by Hobart Brothers. Write them, and when writing don't forget to mention the American Garage & Auto Dealer.

### The New and Practical Pre-Heating Furnace of the Hauck Mfg. Co.

Anybody who does welding to any extent realizes that the success of his work depends not alone on his skill as a welder, but also on the manner in which the job is prepared for the welding.

Experience has taught that metal cannot be welded cold, because as the weld cools, it contracts and pulls away from the cold metal in the casting—thus rendering the job useless.

A practical and satisfactory furnace for pre-heating is being manufactured by the Hauck organization. It consists of a deep box or oven with detachable cover, mounted on a pre-heating table. The box is large enough to accommodate a block of six cylinders and other small parts at the same time. It is equipped with three sliding doors, enabling the operator to watch the work and see that it is not overheated.

The inside of the box is lined with asbestos, which retains the heat, and the oven

can be used for reheating after welding. The burners can then be turned off and the castings allowed to cool gradually.

By removing the box and cover, the furnace is converted into a pre-heating table. The combustion chambers through which the flames of the kerosene pre-heating burners travel are lined with a patented type of refractory brick, which breaks the flame up into a number of small, soft, radiating flames. This is an important item in evenly and thoroughly transmitting the heat to the casting or broken machine parts to be heated.

The furnace has been found invaluable, says the Hauck Mfg. Co., for such work as welding gears, crankcases, and other parts with comparatively large areas and of intricate formation. The even heating prevents cracking and avoids any possibility of unequal expansion. The capacity of the average size shop is said to be increased threefold with a device of this nature.

For further particulars write to the Hauck Mfg. Co., 126-134 Tenth St., Brooklyn, N. Y. Mention the American Garage & Auto Dealer when writing.

### Fireless Cooker Tube Plate Gives Promise of Satisfying Results.

No vulcanizing shop can expect to build up a business on the work it turns out if that work is not above standard, states the R. T. Sales and Mfg. Co. To get the best results the most up-to-date equipment is required.

The R. T. organization is therefore placing on the market a type of vulcanizer—a fireless cooker tube plate—which it claims will meet the demand of the trade for efficient work. This is a steam plate, electrically heated and automatic in operation. The vulcanizer is enclosed in a wooden case packed with asbestos to prevent radiation of heat, and is said to work equally well on alternating or direct current.

Just turn on the switch, states the manufacturer. The fireless cooker tube plate heats up in 12 minutes and is its own

watchman, turning off and on automatically to hold the steam pressure at 60 pounds. The cost of operation is one to one and one-half cents per hour. No loss of time, no waste is encountered. The fireless cooker tube plate fits any workbench. No plumber or steam fitter is needed to connect it up.

The company fully guarantees its vulcanizers to be free from defects in material and workmanship and any parts that prove defective within one year from the date of purchase will be replaced free of charge.

Further information and trade prices can be obtained from the R. T. Mfg. & Sales Co., 3847 W. Madison St., Chicago. When you write for further particulars, mention the American Garage & Auto Dealer.

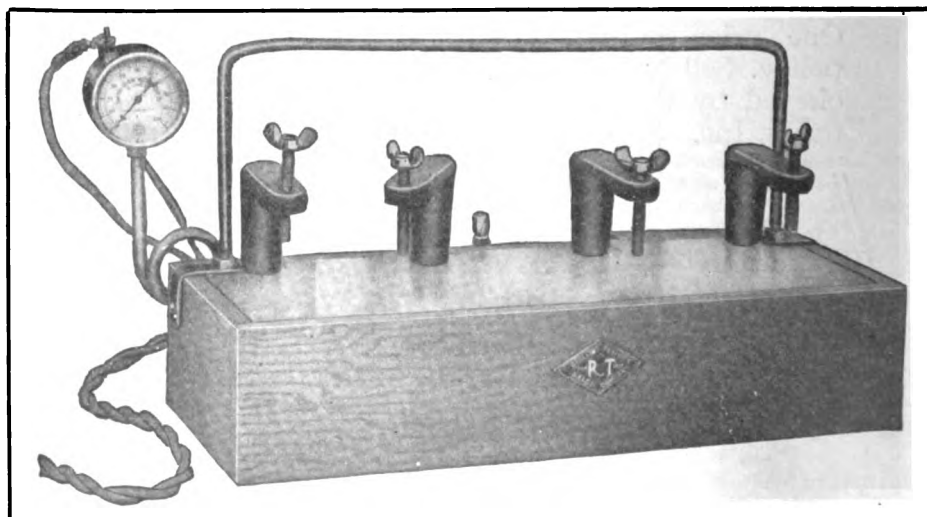
### Test Stand for Locating Starting and Lighting Troubles.

With the F-B test stand, all Ford starting and lighting system troubles may be located and repaired under conditions identical with those in the actual use of the car, says the Fairbanks Co.

The "cutting-in speed" is shown and also the "regulation" and "high speed." The third brush location can be properly made with this equipment. Motoring speed and current draw of the generator is shown as well as the "torque" and running speed of the motor. Any shorts or grounds are easily located with the tell-tale and test points.

Every provision is made for the proper testing and repairing of the generator and motor. Thus the repairman is absolutely assured that the equipment is O. K., after he has tested and repaired it on an F-B test stand.

The F-B test stand is exclusively distributed by the Fairbanks Co., Broome and Lafayette streets, New York City. Further particulars can be obtained by those who write the company, mentioning the American Garage & Auto Dealer.



The Vulcanizer is Enclosed in a Wooden Case Packed With Asbestos.





## BATTERY WORK

### The Keystone of your Winter Business

There are no slack winter months for the shop that has a battery department that can give dependable and satisfactory service.

We have a battery proposition that will appeal to every garage and repairman who wants to make the dull season live, and make the winter as well as the summer profitable.

No large investment required.

*Write or wire us at once regarding exclusive territory*

### R. T. Mfg. & Sales Company

Factory  
GREEN BAY  
WISCONSIN

Sales Dept.  
3847 W. Madison St.  
CHICAGO, ILL.



## PACKARD RETAIL SALES

### Oplex Signs Always Suit Their Surroundings

**A**N OPLEX ELECTRIC SIGN will add a touch of dignity to any building. Instead of detracting from the architecture it gives grace and strength, and at the same time it tells the story of the business in clean-cut, raised, snow-white letters.

That is why the sales rooms, where dignity and distinctiveness are prized, have Oplex Signs. They are the only signs which suit all the needs of the case—perfect day signs as well as electric night signs. They have greatest reading distance, lowest up-keep cost, but above all, that air of distinction which is so important in every detail connected with the sale of a car of quality.

The Flexlume designers will be glad to send you a sketch showing a sign designed to suit *your* particular needs.

**The Flexlume Sign Co.** ELECTRICAL ADVERTISING  
Niagara and Potomac, Buffalo  
Pacific Coast Distributors  
Electrical Products Corp. Canadian Factory  
Los Angeles, Cal. **The Flexlume Sign Co., Ltd.**  
Toronto, Ont.

# Here and There in the Motor World

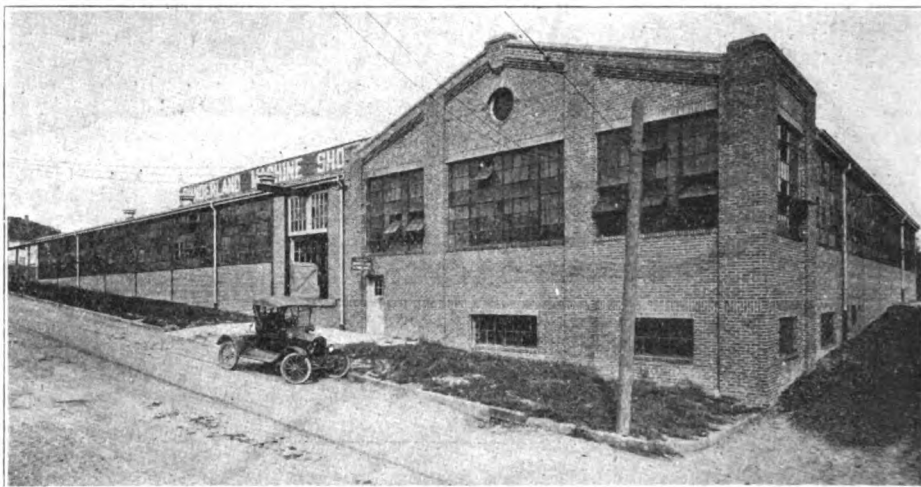
## Prosperous Middle West Plant Promoting Prosperity for Dealers.

Equipment for cylinder grinding and crankshaft work is very expensive and requires a large house for its installation. It also calls for skilled workmen. For these reasons the average dealer's service station is not adequately equipped to do this work.

Seeing this field of usefulness, the Sunderland Machinery & Supply Co. of Omaha, Neb., created a plant of large proportions and placed its facilities at the service of dealers within a large area. The company maintains a working arrangement with many dealers, the effect of which is to raise each service station to the dignity of a large industrial plant. This is accomplished by means of prompt and highly efficient service.

By this co-operative system, dealers are enabled to build up a local business of desirable class which provides prosperity.

The floor space of the spacious Sunderland plant is about 20,000 square feet. The facilities are so complete that work is expedited to the utmost degree with both day and night shifts. Dealers are assured that they can send in their orders under prom-



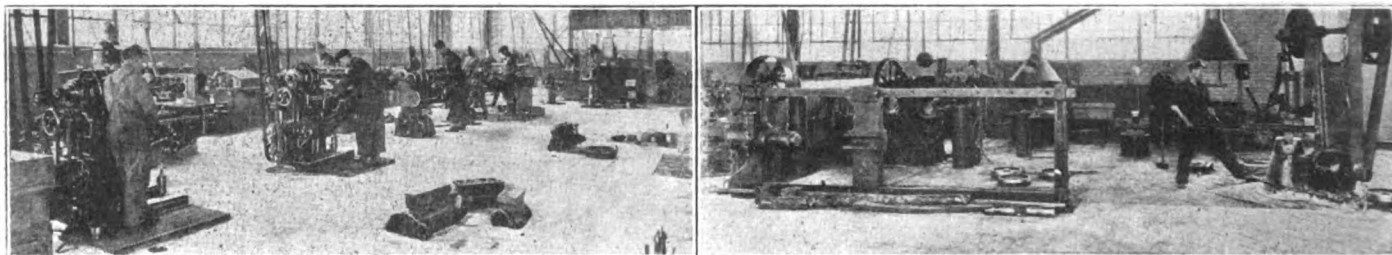
The Plant of the Sunderland Company is a Very Imposing Brick Structure.

are special machines for use on extra large stationary and tractor engine cylinder jobs. These work with a high degree of perfection and have made many friends for the plant.

In the crank grinding department are a number of special crank grinding machines which solve for the repairman the problem of re-fitting main and connecting-rod bear-

the company, there is no warping or distorting of the cylinder.

The Sunderland plant is equipped with the most approved type of machinery for manufacturing auto-truck and tractor engine pistons and rings. The company carries a large assortment of finished and semi-finished pistons which it offers to the trade for many different makes and sizes



A Section of the Automotive Motor Service Department and a Glimpse of the Great Welding and Blacksmith Shop.

ise to the car owner that his car will not be tied up more than a few days. This expedition is one of the strong factors of the plant. The company guarantees dependable work—a guarantee in which the dealer has learned to have implicit confidence.

The manner in which cylinders are ground is of absorbing interest. There is a battery of cylinder grinding machines for automobile, truck and tractor cylinder grinding. In addition to the grinders, there

ings on worn crankshafts. The Sunderland plant regrinds crankshaft bearings and claims to put the shaft in the same condition it was when it left the factory, insofar as it relates to the accuracy of the bearings, smoothness of surfaces. And in doing this, no more stock is removed than is represented by the high spots on the bearings.

Another interesting department is that in which scored cylinders are repaired by the patented Eagle process. This process is mechanical. No heat is used, therefore, says

of motors. The stock of standard and oversize piston rings in the plain step cut type is very complete. Steel gear rings for starter flywheels are manufactured and a large assortment of makes is carried.

Located in the heart of a great producing area, the future outlook of the Sunderland company is very bright. The company is constantly planning to take care of the trade which, owing to the quality and quantity of work that the Sunderland organization produces, is ever-increasing.



A Battery of Cylinder-Grinding Machines Takes Care of This Line of the Work—View of the Bustling Gear-Cutting Section.

# You get a good share of the profit.

The **MODEL "N" MARVEL CARBURETER** improves car performance, and increases mileage from 22 to 25 miles per gallon.

No changes are necessary to install it. Fits right in place of regular installation.

## MARVEL CARBURETER

*Designed especially for FORDS*

sold on 30 days' trial, with money back if not satisfactory.

Price F. O. B. Factory \$10.00

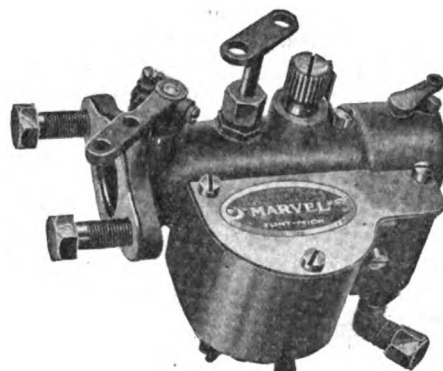
**MODEL "E" CARBURETERS** are standard on Buick, Oakland, Nash, Scripps Booth, GMC, Wilson and all  $\frac{3}{4}$ -ton U. S. A. Government Trucks.

**MODEL "E" Carbureters** greatly improve Maxwell, Overland, and Studebaker cars.

*DEALERS--If interested, write for further information*

**MARVEL CARBURETER COMPANY**

FLINT, MICHIGAN, U. S. A.



# Draws Business Like a Magnet



**Federal Electric Sign**

Now is the time when you need more business. It won't be long before car owners and tourists will put up their cars for the winter. In the dark days of autumn, it is all the more necessary that you keep your garage brightly lighted so that you can attract attention of customers who might otherwise pass on to one of your competitors.

## 9 Months to Pay

Brighten up for the dark days—they are coming. Erect a handsome Federal Electric Sign. Made of porcelain enameled steel, it will not rust, rot or fade. An occasional washing keeps it bright and shining like new.

Don't let any business pass you by. Send coupon today for full information.

**Federal Electric Company, 8700 South State Street, Chicago**

Please send full information on Enameled Steel Sign for my business and your 9-months-to-pay plan. No obligation.

NAME .....

ADDRESS .....

BUSINESS .....

AGAD-11

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

### Records of Black & Decker Co. Indicate Business Increase.

Indications of a bettering of business conditions are found in the advertising records of the Black & Decker Co., of Baltimore, Md., according to a recent bulletin issued by that organization.

The curve of inquiries from the company's advertising generally corresponds with the sales curve, but runs a month ahead of it. A study of the curves shows a fall in business during June, which had been preceded by a drop in inquiries during May. The inquiry curve for August went up, indicating better business for the fall months.

The Black & Decker Co. has been using emergency methods to keep its plant up with the demand. In order to secure small electric motors for its drills and air compressors, it has been operating motor trucks between Ft. Wayne, Ind., and Baltimore, carrying drills and compressors westward and motors eastward.

### A Frank Story of Gasolene Told for the Millions of Users.

Gasolene is one of America's great necessities. The number of automobiles has increased a hundred times within half a generation—and the possible supply has increased but 12 times. Yet everyone can drive his car whenever he likes. By great patience, determination and mechanical ingenuity, the industry has kept pace with the increased demands for good gasolene. "The Story of Gasolene" is a story of progress and ingenuity.

A little book bearing this title has just been issued by the Atlantic Refining Co. In non-technical language it explains the essentials of good gasolene, the process of carburetion, the test of gasolene in traffic driving, cost of gasolene, and gasolene's future. A diagnosis of engine troubles and their relations to gasolene is presented.

It is a book that every garageman, every dealer, will want to read for it is, according to the Atlantic Refining Co., the first article bearing the stamp of authority that has put the facts about gasolene frankly before the gasolene-using public.

For copies write to the Atlantic Refining Co., 1211 Chestnut St., Philadelphia. Mention the American Garage & Auto Dealer when writing.

### A Compact Catalog of Taps, Dies, Screw Plates and Reamers.

Looking forward to the betterment of conditions both in the manufacture and use of screw cutting tools, Butterfield & Co. have published a complete 173-page catalog covering taps, dies, screw plates and reamers.

For 40 years the Butterfield organization has been making cutting tools. It advocates the adoption and use of the U. S. standard form of thread and with a view to assisting in the movement in this direction, has listed some additional pitches

in its catalog under the heading "U. S. Std. Form," which will make it practical when fine pitches are used, to adopt this standard.

By adopting the U. S. standard, tap manufacturers, screw manufacturers and bolt and nut manufacturers all work to the same gages and are thus able to make interchangeable products. With V threads, there is no recognized standard to work to and no two manufacturers work to the same gages.

Butterfield & Co. in their large plants has installed the most modern and complete equipment, specially designed for rapid and accurate production.

The catalog, No. 18, just issued is amply illustrated by clean-cut engravings. Arbors, collets, countersinks, dies, die holders, guides, reamers, screw plates, screw-plate stocks, stock and dies, taps, threads and reamers are clearly and interestingly described.

Every reader of the American Garage & Auto Dealer interested in these products should write for this catalog. Address Butterfield & Co., Derby Line, Vt. Mention the American Garage & Auto Dealer when writing for copies.

## BOOK REVIEW.

OPERATION AND CARE OF VEHICLE TYPE BATTERIES, Circular No. 92, Bureau of Standards, Published by Superintendent of Documents, Government Printing Office, Washington, D. C.; 94 pages, 66 illustrations, Price 30 cents.

With the co-operation of the Construction Division of the Army, the United States Bureau of Standards has prepared a circular which is a manual of instruction for the care and operation of storage batteries. Garagemen and repairmen will find it a complete analysis of the storage battery, a book for general use and application. There are 66 diagrams and illustrations which simplify the text.

The first of the 15 chapters in this circular is a general introduction dealing with the distinction between primary and secondary batteries, methods of grouping cells, and types of storage batteries. Chapters two, three, four, five, and six deal with the lead-acid type batteries, nickel-iron type batteries, reactions, capacity, and voltage respectively.

The next five chapters deal with the resistance of the battery and its relation to the external circuit, sulphation of lead batteries, electrolyte, testing, charging. The last four chapters take up the receiving of a new battery, dismantling and assembly of lead-acid type, cleaning lead-acid type, and storage.

In addition to the 15 chapters, there are five appendixes giving War Department specifications for storage batteries for industrial trucks and tractors, War Department specifications for battery charging equipment, record forms, costs of operation, and a glossary.

### Large Export Order Received by Elgin Motor Car Corp.

The Elgin Motor Car Corp. recently received an order for approximately \$1,500,000 worth of Elgin Sixes from Gaston, Williams & Wigmore, of New York, for shipment to the various countries of Europe.

Charles S. Rieman, president and general manager of the Elgin corporation, states that although the company has already formed numerous valuable connections in other parts of the world, this is the largest single order it has ever accepted.

### Blaze Destroys a Unit of O. K. Giant Battery Corp. at Gary.

Fire recently destroyed the main building of the O. K. Giant Battery Corp. at Gary, Ind., and damage to the amount of \$200,000 was done to the plant. Fortunately the fire was confined to one building which contained the offices of the corporation.

The fire was caused by an explosion in the main laboratories which gained headway so rapidly that none of the office records were saved. None of the new buildings in the course of construction was damaged and, while the fire was still raging, the board of directors met and formulated plans for hastening the completion of the six units under construction. E. W. Wickey, president, stated that "production would be delayed but a short time, possibly ten days, when new equipment now in readiness to be installed, would be in operation and production started on a larger scale than was anticipated before the fire."

Dealers who have been seeking the agency for the O. K. Giant dry rechargeable battery should file other applications immediately as this correspondence was entirely destroyed.

## Paragraphs.

THE NEW ERA SPRING & SPECIALTY CO., Grand Rapids, Mich., announces that the Richards-Wilcox Canadian Co. of London, Ont., has been given the sole license to manufacture and market New Era bumpers in Canada. It is understood that Richards-Wilcox of Canada will also make H. & D. shock absorbers and perfection heaters for Canadian trade.

THE STORM MFG. CO., Minneapolis, Minn., was unable to procure space on the floor of the Coliseum for the Chicago automotive equipment show November 15 to 20, but secured window display and floor space directly opposite the main entrance of the Coliseum, with the Ex Cel Battery Co., 1502 S. Wabash Ave. Here the Storm vertical power boring mill and other equipment is being featured.

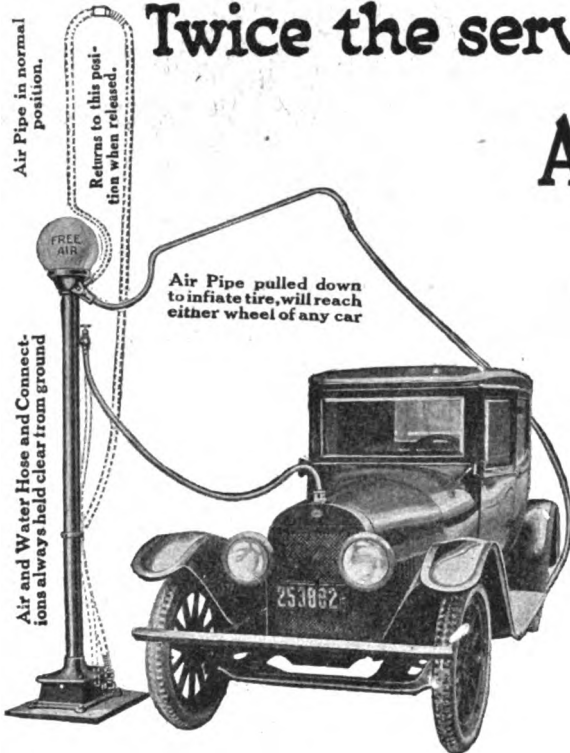
THE ROLLER-SMITH CO., 233 Broadway, New York City, announces the appointment of the Mountain States Machinery Co., 1710 Glenarm Street, Denver, Colo., as its agent in the states of Colorado, Wyoming and New Mexico.



# THE ROMORT AIR & WATER STATION

Twice the service in half the time

## ARE YOU EQUIPPED



*A Monument to Service*

To give the Motorist the best of service? Are you doing everything possible to provide for his convenience? Are you creating good will? Are you making new friends and customers?

Let the Romort Air and Water Station help you. Rendering the cleanest, quickest and most efficient Air and Water Service possible, it will make friends, build business and fatten profits.

Its service is unparalleled.

It will pay you to investigate. A postal to our sales department will bring full details.

Manufacturers  
**THE ROMORT MFG. CO.**  
OAKFIELD, WIS.

Sales Dept.  
**THE ZINKE CO.**  
1323 Michigan Ave.  
CHICAGO, ILL.

## Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

**Over 350,000 sets now in use**

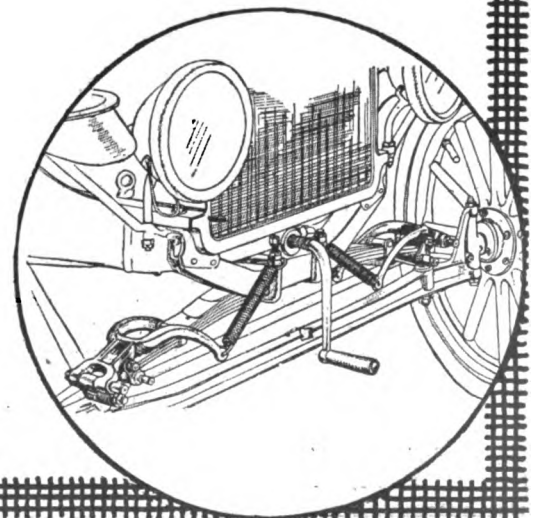
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

**Price \$12.00 per set of four.**

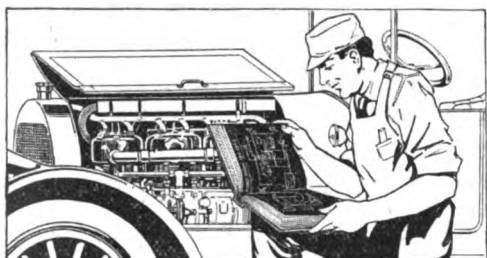
DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

**P. H. Webber Company**  
HOOPESTON, ILL.

Chicago Sales Office:  
**WALTER ECKHOUSE & CO.,** 616 S. Michigan Ave.  
In Canada—**RICHARD-WILCOX CANADIAN CO., Ltd.**  
London, Ont., Canada



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



## Automotive Wiring Manual

is what you need to render quicker and more accurate electrical service and make more money. There is nothing to equal it on the market at any price that gives you the authentic, down-to-date electrical information on any and all cars and trucks as contained in the new 1920 edition. Contains blueprints on all cars and trucks from 1912 to date.

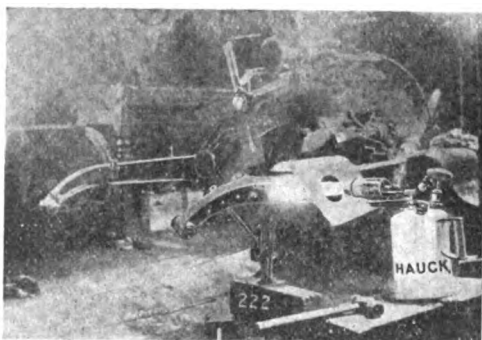
Over 800 blueprints; over 600 models of cars; 200 internals. Full size of blueprints, 7 1/4" x 11", large enough to be easily read; no need for magnifying glass to make out details. Bound in one volume, thus always complete, an advantage you cannot secure elsewhere.

### QUIT GUESSING—KNOW

Your reputation as an Electrical Expert will not be made through an occasional lucky guess. You should know every time just what you are doing. The best assurance that you will is through the purchase of the Automotive Wiring Manual—1920 Edition. Price \$15.00 delivered.

## Automotive Publishing Co.

448 South Dearborn St. : : : Chicago  
910 So. Grand Ave., Los Angeles 41 E. 29th St., New York



## Twisted Chassis Straightened in 6 Minutes with a Hauck No. 14 Kerosene Torch

A piece of sheet iron bent in the manner shown in the illustration was used to confine the heat to the part to be straightened, which became cherry red in less than 5 minutes.

The powerful, blue-red flame of the burner is clean, without smoke or soot. The burner is made of special heat resisting metal, without coils. All the oil passages are straight and can easily be cleaned. The oil valve has a ball check to prevent the hot oils from the burner returning to the tank.

A new feature of the Nos. 14 and 15 sizes, is the priming pan valve.

Besides straightening, the Hauck Torches are used for expanding, brazing, soldering, preheating and melting babbitt out of bearings.

Write for prices and copy of Bulletin No. 104  
"Quick Auto Repairs"

## HAUCK MANUFACTURING COMPANY

126-134 Tenth Street, Brooklyn, N. Y.



## RADIATORS for all Cars and Trucks

**OUR SPECIALTY:** Installing *new honeycomb cores* in old or damaged radiators, and returning them within two days after receipt by us or furnishing new cores only, to be installed by radiator repair men throughout the country. We furnish new radiators complete at less than manufacturers' prices.

*Dealers and garage and repair shop owners—*  
Patronize our extensive Radiator Department.  
**IT WILL PAY YOU.**

*Prices and samples of Core on Request*

## INTERNATIONAL RADIATOR CO.

DEPT. B

1507 Michigan Ave., Chicago, Illinois

## Air! the life of the tire depends on it

Do not be afraid to press  
the purchase of a  
**SCHRADER UNIVERSAL  
TIRE PRESSURE GAUGE**  
on a customer.

He will thank you for it  
after he discovers the  
saving in both tires and  
gasoline that it makes  
possible.

Price \$1.50



**A. Schrader's Son Inc.**  
783 Atlantic Ave., Brooklyn, N.Y.

CLARKS  
UNIQUE  
TRADE MARK

## MOVE THOSE USED CARS NOW

SAVE  
\$100 TO \$200 ON  
THESE FINE CARS

|          |            |        |
|----------|------------|--------|
| FRANKLIN | LINCOLN    | \$595  |
| OVERLAND | 6 CYLINDER | \$645  |
| CADILLAC | LANDAULET  | \$1975 |
| MERCER   | TOURING    | \$995  |
| GRANT    | CABRIOLET  | \$490  |

ALL IN GOOD CONDITION

MODEL H520

FOR NOW IS THE  
TIME AND YOU'VE  
GOT TO GET BUSY

## "UNITYPE" SIGNS

not only do this, but they modernize the appearance of your show room.

A changeable sign—strong white on black (quick changing) that graces the magnificent show rooms of the Metropolitan Auto Rows will brighten up and put life into *YOUR* place too.

UNITYPE SIGNS sell your used cars for you—they bring you new customers from off the street.

UNITYPE SIGNS are all metal and come in many sizes and styles at prices within reach of all.

ASK FOR CATALOG "AG-20"  
APPLIED TO AUTO DEALERS

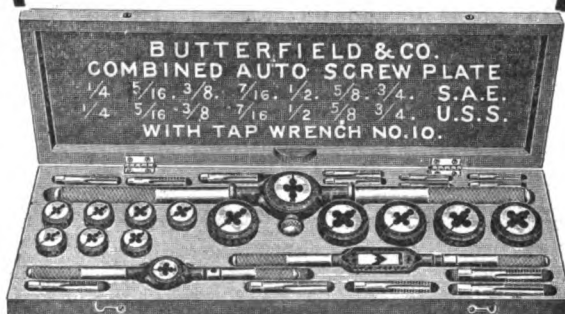
W. L. CLARK COMPANY, Inc.  
115 NASSAU ST. NEW YORK

SOLE AGENTS AND EXCLUSIVE MAKERS

## BUTTERFIELD

### Combination Automobile Screw Plates

serve best on automotive work because they were designed expressly for garages and repair shops.



Set shown in illustration enjoys a well deserved popularity in the automotive field.

Contains in one set—both U. S. Standard and S. A. E. Standard taps and dies—thus saving the expense of buying a separate outfit of each.

Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

Write for Catalog No. 18.

**BUTTERFIELD & CO. DIV.**

Union Twist Drill Co.

Derby Line

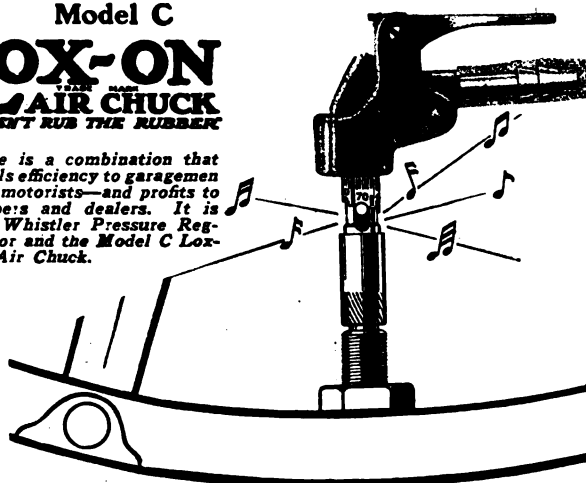
Vermont

U. S. A.

Model C

**LOX-ON**  
LAIR CHUCK  
DON'T RUB THE RUBBER

Here is a combination that spells efficiency to garagemen and motorists—and profits to jobbers and dealers. It is the Whistler Pressure Regulator and the Model C Lox-on Air Chuck.



## Accessories That Deliver Service and Pile up Profits

THE MODEL C, LOX-ON AIR CHUCK is the newest invention for direct pumping garage equipment, engine driven and hand pumps. It completely supplants the old type "push on" and "pull off" chuck. The Lox-on opens to slip over the valve, then a simple thumb pressure on the lever locks it tightly, absolutely preventing any leakage. And it does not wear the rubber cylinder either. There are no rubber washers to be replaced often. Sold singly or 6 on an attractive display card. Furnished for 1/4 inch I. D. hose unless otherwise specified. Furnished for 3/16 inch and 3/8 inch hose on request. List price in U. S. A. \$1.25 each.

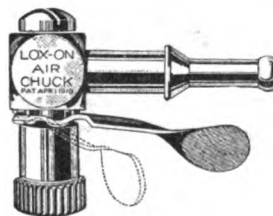
THE WHISTLER Pressure Regulator is one of the fastest selling accessories on a dealer's shelf.

And it's a *self-seller*.

The best way in the world to sell the Whistler, is to show what it can do on a tire. Almost every time, one demonstration means a sale. Try this — Put a Whistler on your regular tire valve. Set it for exactly the amount of air pressure you want in your tire. Attach the hose. As soon as the right pressure is reached, the Whistler automatically closes, warning you with a cheery whistle. You can't put any more air in. Sell Whistlers and you spell success. \$4.00 per set of 4. List price in U. S. A.

Model A

**LOX-ON**  
LAIR CHUCK  
DON'T RUB THE RUBBER



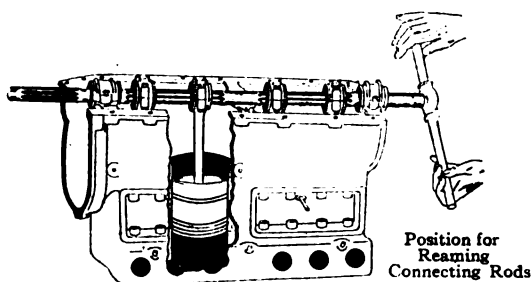
You don't have to push the Lox-on Chuck down over the valve. It slips over and grips it! That's why the rubber lasts indefinitely and it is absolutely guaranteed not to leak. It saves electric bills, cuts down wear and tear on pumps and increases the efficiency of your air hose connection. Fits either 1/4-inch or 3/8-inch I. D. hose. List price in U. S. A. \$3.00 each.

Automatic Safety Tire Valve Corp.

1753-55 BROADWAY

NEW YORK CITY

Factory: Long Island City, New York



## The LEWIS REAMER Multiplies Profits

In more ways than one. It takes only an hour and a half to ream the seven bearings in a Ford motor as against eight hours by the hand method. Your labor cost is further reduced by the fact that you do not need a high priced mechanic to operate your Lewis Reamer. Any man in your shop can do satisfactory work on either connecting rods or main bearings.

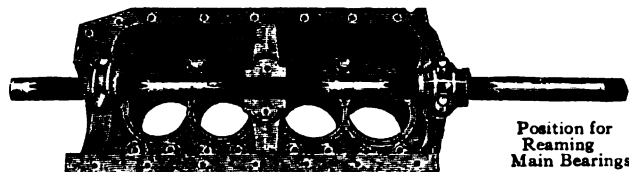
Your customers will be highly pleased with the perfect work turned out by your Lewis Reamer. The first three jobs pay for it.

Ask your jobber or write us today for particulars.

### LEWIS TOOL COMPANY

612 Fifth Ave., South

Minneapolis, Minn.



## GANSCHOW GEARS

for service and reliability

The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

Write today and feel free to consult our Engineering Department.

Wm. Ganschow Company

1002 Washington Boulevard  
Chicago, Illinois



# FINCK'S

DETROIT SPECIAL  
OVERALLS & COMBINATION SUITS

Stand Everything  
But Acid

*There are a million reasons why you should wear Finck's Comfort Combinations—there are a million wearers. The "Pig" ticket guarantees them.*

Finck's Combination Suits have made "wonderfully good" for auto-workers, mechanics and garage men. The materials are the best and the garments are made perfectly. That's why they wear. They are cut extra big—so they will fit after washing. That makes them comfortable—all the time. In summer they are cool—yet snug-fitting enough to afford absolute protection to garments worn under them. They are convenient, too—plenty of pockets. In every detail as perfect as garments of this kind can be made.

Ask your dealer or write to us, if he can't supply you.

**W. M. FINCK & COMPANY**  
Detroit, Michigan

Manufacturers of High Grade Overalls, Men's and Women's Combination Work Suits

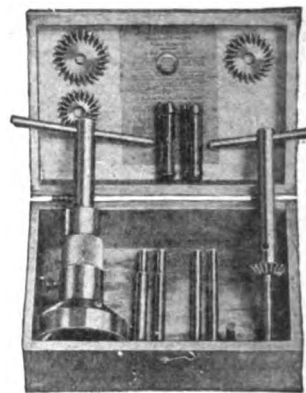
Branches:  
St. Louis, Mo.; Dallas, Tex.; Seattle Wash;  
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## A real friend of the garageman

### FOSNACHT VALVE RESEATER

The oldest valve seater on the market and still the leader. The quickest, most accurate and most dependable of them all. This compact dependable outfit will serve you long and well—and will pay for itself over and over again.



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EKERN PORTABLE GARAGE GREASE GUNS  
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EKERN MOTOR STAND FOR FORD MOTORS  
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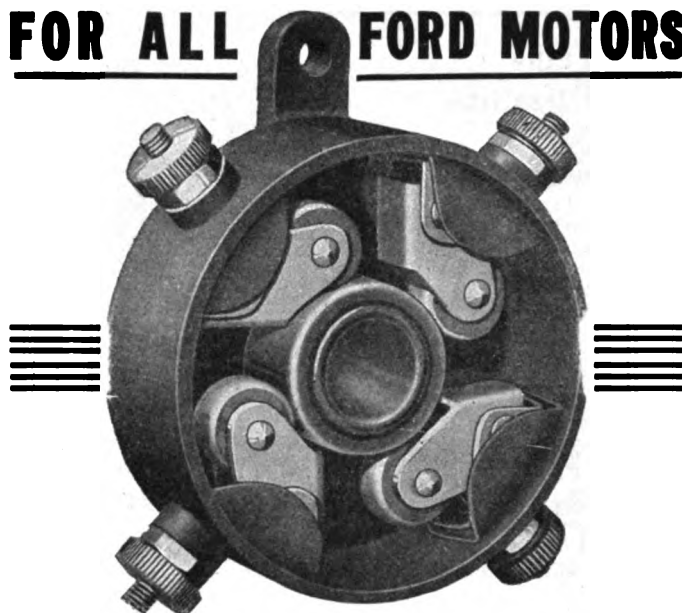
*PARO Co.*

Ask your jobber or write us for literature on this money-making equipment.

1412-14 S. Michigan Avenue,

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**FOR ALL FORD MOTORS****DUNTLEY 4 UNIT TIMER  
FOR QUICK STARTING IN COLD WEATHER**

On the coldest day in winter the mighty spark of the Duntley never fails to start your motor with a quarter turn, for

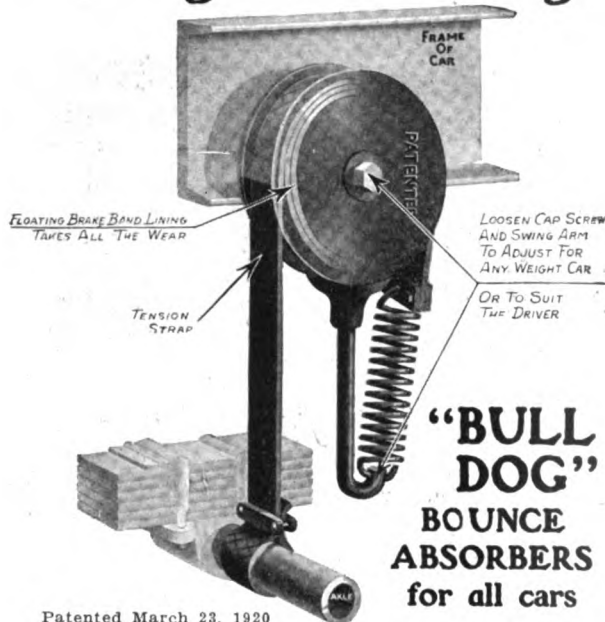
Unhampered by oil thickened by the cold the action of the Duntley is constant regardless of weather conditions.

Dealers Note: If you are looking for a self selling proposition with a quick turnover you should write us to-day.

**J. W. DUNTLEY**

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CHICAGO, ILLINOIS

**No more broken springs  
Better tire service  
More gasoline mileage**

Patented March 23, 1920

relieve the strain that break springs and wear out tires. Can be adjusted to fit any car. Made for both front and rear springs. DEALERS—Get data and trade prices.

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**Pondelick Brothers**

will pay **\$100**

if they fail to duplicate any part of any make of automobile or truck foreign or domestic, submitted to them. That sum will be paid to the person sending the order.

Parts of any machine can be duplicated in 1 to 3 days' notice. All welding is done at their risk. Do not compare this work or welding with that of others. If you have a broken part or parts that others cannot weld or repair, send them to Pondelick's. They increase the durability of many parts—even where the manufacturers fail.



Supply your customers with "Pondelick's" anti-leak piston rings, and you insure them against engine trouble.

They have the largest and best equipped plants in the United States for the repair or reproduction of automobile parts.

Cylinder regrinding, new piston, special casting, heat treated, Pondelick's self-adjusting, anti-leak piston rings, new wrist pin, hardened and ground, bushing made of genuine bronze, including fitting and assembling of connecting rod to piston for \$15.00.

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**For Every  
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Many an unexpected meeting is turned to profitable acquaintance through a Wiggins book-form card.

For one thing, a Wiggins card is always on hand, clean and presentable. Every card has a straight, smooth edge—no unsightly perforations—and they are protected by a neat leather cover that just fits the vest pocket.

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**THE JOHN B. WIGGINS CO.**  
Established 1857  
1104 So. Wabash Ave. 705 Peoples Gas Bldg.  
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**WIGGINS**  
Peerless  
Book Form  
**CARDS**

# Cheaper Heat For Your Garage

Burn plentiful kerosene. Cost only half as much as coal. Better in every way for you—cheaper, cleaner, easier heat. No expensive coal pile to worry about. No dirt, safe. Guaranteed. Odorless.

## VICTORY OIL STOVE

**No Work—No Risk**  
Burns Until Turned Off

Patented metal burner lights with match. Gives instantaneous heat. No time wasted. Stove throws terrific heat when desired, or will turn down as low as needed. Best heat imaginable for garage, office, workshop, etc. Will heat all three.

**INVESTIGATE** Write NOW for book, "The Sensible Heat for You." Sent FREE. Gives low factory prices, description and letters from garage owners.

**AGENTS**—Get our agent's and dealer's proposition. Some good territory still open.

**Victory Oil Stove Co.**  
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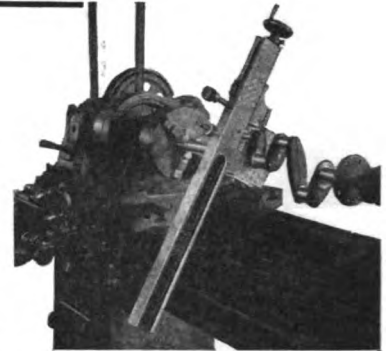


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Chicago, Ill.  
"We have been using successfully and with satisfaction in our store one of the stoves. We find the stove odorless, easy to control and inexpensive of operation." Truly yours,  
L. D. Wells Motor Co.  
L. D. Wells, Pres.

**No Filing  
No Offsetting  
No Jigs**

The Weber Tool turns ALL Pins from ONE setting of the Crank Shaft, ON CENTERS. It is the only Tool of its kind that will leave a pin absolutely parallel to the main bearings. The cutter used is a Forming Tool, cutting entire width of pin at once. A micrometer dial enables operator to gauge his cuts and turn all pins to a uniform size.



Perfected and Proven

## Weber Crank-Pin Re-Turning Tool

How many times have you assembled a gas engine, knowing full well that the crank shaft needed truing up? You did not want to send it out and delay your customer. You knew, too, that it would cost considerable to have it done.

With the Weber Tool **you can do** this work whenever necessary. **NO DELAY—NO EXPENSE.**

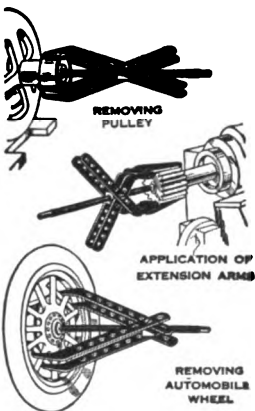
Why not do this work **in your shop** and have more satisfied customers and put **more profits** in your own pocket?



The Weber Tool is guaranteed to turn crank-pins within as close limits of accuracy as any other known method.

Picture at top shows Weber Tool in operation on 4-throw Crank Shaft. All four pins are turned and finished from this one setting. Write for Circular and prices or ask your jobber.

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Pulls any gear, wheel or pulley anywhere in a jiffy. Built on the only correct principle. Produces maximum efficiency with minimum effort. Can't twist off or let go. **THE HARDER THE PULL—THE TIGHTER THE GRIP.** Reduces operating cost and increases the earning capacity of any Repair Shop. Made from best grade drop forge steel. Almost unbreakable. Adjustable up to 13 inches diameter. Satisfaction guaranteed or money refunded. Order or write for details today. Price complete with extension arms, \$12.00.

Liberal Discounts to Dealers.

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All repairs can be made with ALUMIFLUX without removing the part from the car. ALUMIFLUX will work successfully with aluminum, copper, iron (gray, malleable, or galvanized), tin, zinc, lead or brass.

Not affected by gasoline, oil or water, hot or cold. Will stand heat up to 600 degrees and pressure to 250 pounds.

Write for full particulars

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BENTON HARBOR MICHIGAN

When Springs Break, put on



**VULCAN**  
The Replacement Spring

Our metal nameplate is on every genuine VULCAN spring for your protection.

If your jobber cannot supply you, write us—today.

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Richmond, Indiana.

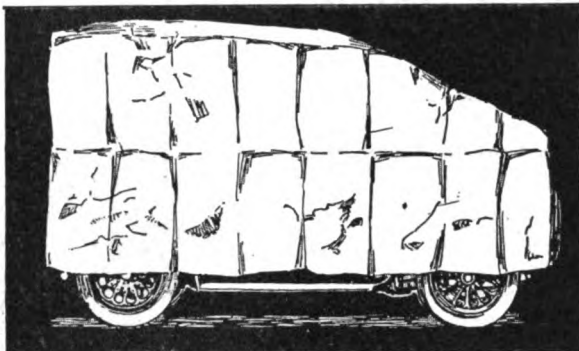
America's Aviators Used

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## High Compression PISTON RINGS

*The Standard of Efficiency*

**BURD HIGH COMPRESSION RING CO., Rockford, Ill.**



**Increase the profit of this winter's storage business with**

## **KENNEDY Auto Covers**

the most effective and economical means of protecting cars in storage from dust, dirt, rust, and cold. Car owners readily appreciate the value of Kennedy Covers and you make a good profit on each one used. They are a drawing card for your storage business, and are also quick sellers to car owners who keep their cars in their own garages. Made of strong heavy paper, properly reinforced, and correctly designed in standard sizes to fit any car.

Fill up your storage space this winter and get the repair and equipment business that goes with it.

Write today for prices and details.

**The Kennedy Car Liner and Bag Co.**  
Shelbyville Indiana

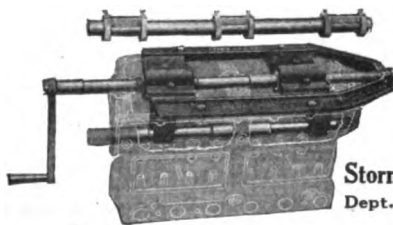
Canadian Factory at Woodstock, Ont.

# **STORM**

## **MOTOR REPAIR EQUIPMENT**

installed in your garage will double your profits and give you a reputation for *quick, accurate* repairing.

**The Storm Main Bearing Babbitting and Boring Tool**



for Ford and Fordson Motors—puts in new, perfect bearings exactly the same as the original and in the proper position.

Write today for complete information

**Storm Manufacturing Company**  
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The steering column brace eliminates all vibration of the wheel and holds it solid. Other cars use one - *Fords Need It.*

Sold by dealers everywhere, or prepaid on receipt of price.

ApcoMfg. Co., Providence



**\$1**

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Every time you equip a customer's car with the dependable Weston Ammeter you enhance your reputation for efficient service and make a good profit as well.

The

# **Weston**

Model 354

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*The  
Watch  
Dog  
of  
Your  
Battery*



gives the motorist the one reliable means of knowing that his battery is charging regularly and at the proper rate.

This is the Instrument with which the public is familiar through our National advertising campaign. The motorist knows that he can count on the Weston—that it is always on guard over his battery.

Standard equipment on most of the higher-grade domestic and foreign cars, this Instrument has built for itself a world-wide reputation for accuracy, dependability and efficient service under the most trying conditions of hard use. Write us.

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30 Weston Ave., Newark, N. J.  
Branches in All the Principal Cities.  
Call on us at the New York Show, Space D-206.

## *The* **WASHBURN Torch**

For soldering, burning, brazing, welding—all automotive flame work. 5300 degrees F. from acetylene gas and air—one tip. Four extra tips for full Oxy-Acetylene range. Outfit includes gas-and-air mixer and soldering attachments. Get full information.

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**Means Trouble-Proof Tires  
with Ample Resiliency**

A big seller everywhere because it has made good. Does away with punctures, patching, vulcanizing, tire repairs of all kinds. Users get 10,000 to 20,000 miles out of every tire.

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Write us today  
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Make Money Equipping old FORDS and CHEVROLETS  
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The only way to get proper returns from  
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**Henry Kastens Time Stamps** furnish  
an accurate record of just how long each job  
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It stops the mistakes, losses and complaints  
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Price \$2.75

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EVERY AUTOMOBILE REPAIR  
SHOP NEEDS THIS PRESS

Made in Two Sizes

32 in. between posts - \$75.00  
42 in. " " - 80.00

We also manufacture a complete line  
of Hydraulic Presses for every purpose  
requiring pressure.

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SPRINGFIELD, ILL.



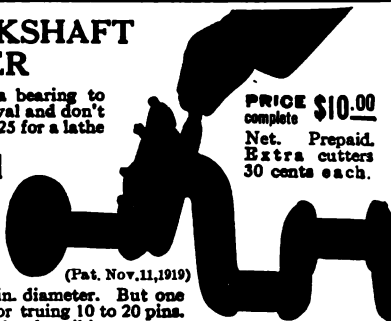
## ATLAS CRANKSHAFT GRINDER

Don't attempt to scrape a bearing to  
crank pin that has worn oval and don't  
pay a machine shop \$15 or \$25 for a lathe  
job. Use an

### Atlas Grinding Tool

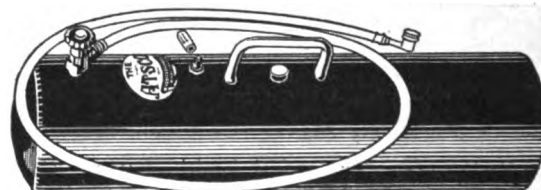
It will true up a crankshaft to less than one-thousandth of an inch in less than one hour without removing shaft from crank case. Adjustable to all crank pins from 1 1/4 to 2 1/4 in. diameter. But one tool needed, cutters good for truing 10 to 20 pins. 5,000 in use. Send for circular describing

PRICE \$10.00  
complete  
Net. Prepaid.  
Extra cutters  
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A machine for testing and straightening crankshafts, and gear press with housing assembly and piston vice attachments.

**ATLAS MANUFACTURING COMPANY**  
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The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

**Air-Tight Steel Tank Company** Pittsburgh, Pa.



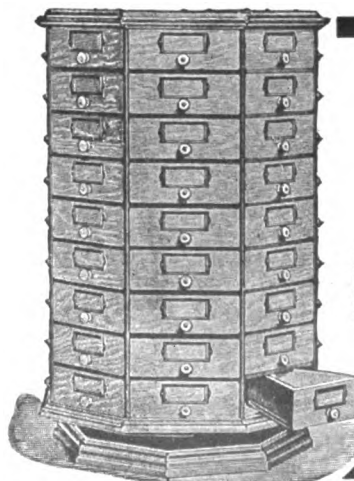
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The Auto Soap that  
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The standard cleanser for  
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Made of pure vegetable oils—no grit, no acid, no alkali. Most  
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Just like "rolling off a log" to look up  
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with nothing to burden your memory.  
Used by leading garages of this country.

Buy today from your jobber.  
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Write for our catalog covering complete line of TORIT EQUIPMENT.

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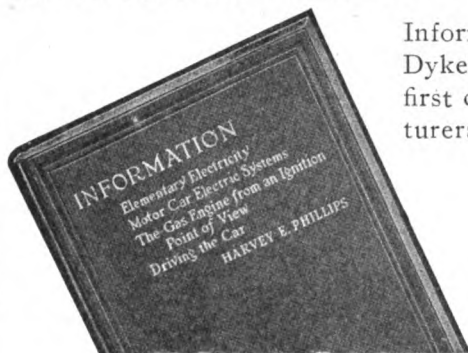
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EXPERT WELDERS. ALUMINUM AND ALL METALS.

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**An Invaluable Service to the Electrical Repair Man**



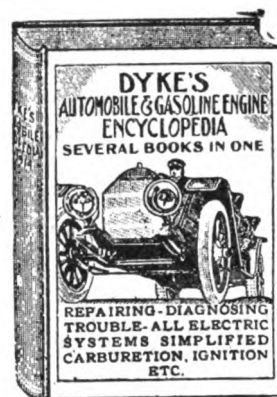
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With Famous Ballistic Movement

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The slow rotation and rapid reciprocation of the grinding shaft not only does a better job than hand methods, but does it more quickly and at a fraction of the cost.

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The pump that is selling best and making big profits for the dealer today is the Rose Tire Pump. The Rose Patent Valve has made it the friend of over 2,500,000 motorists. It sells quickly and on its own merits. There is a big opportunity for every dealer in supplying the demands of his customers. If you aren't handling Rose Pumps, write to your nearest jobber today for information.

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Cylinder Grinding                      Crank Shaft Grinding  
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New Pistons and Rings              Starter Flywheel Gear Rings

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put six cylinder smoothness into four cylinder motors, give any motor more power, more speed, quicker get away and more miles per gallon with less bearing trouble.

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keeps the motor cool, increases power and speed.

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Motors refined and tuned for speed. New and rebuilt motors in stock. Tell us your motor problems. Our increased equipment and space insures prompt service and perfect work.

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**WAGNER AUTO ENGINE CLEANER KEROSENE**

One qt. kerosene and 6 lbs. air pressure cleans all dirt, grit and grease from engine. Prevents wear, actually saves half the usual repairs. Quick, economical, thorough, easy and cleanly to operate. Necessity for repair shops.  
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Spur, internal, bevel, etc.

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Test our service. Write  
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With our **BU-NITE PISTONS**  
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These INTENSIFIERS will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing, and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

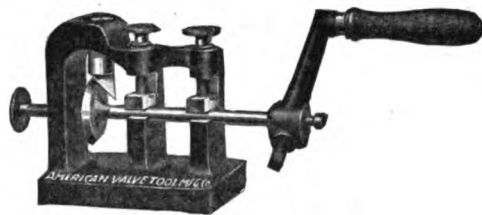
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**JOBBER and DEALERS—Your profit is liberal.**  
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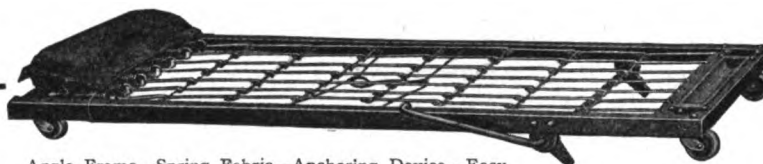
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OVER 30,000 IN USE

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A self-heating soldering iron, torch and light.  
Necessary in every shop. No torch to generate. Copper points heat in one minute.

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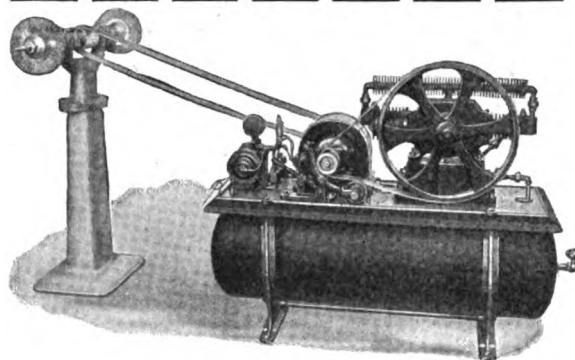
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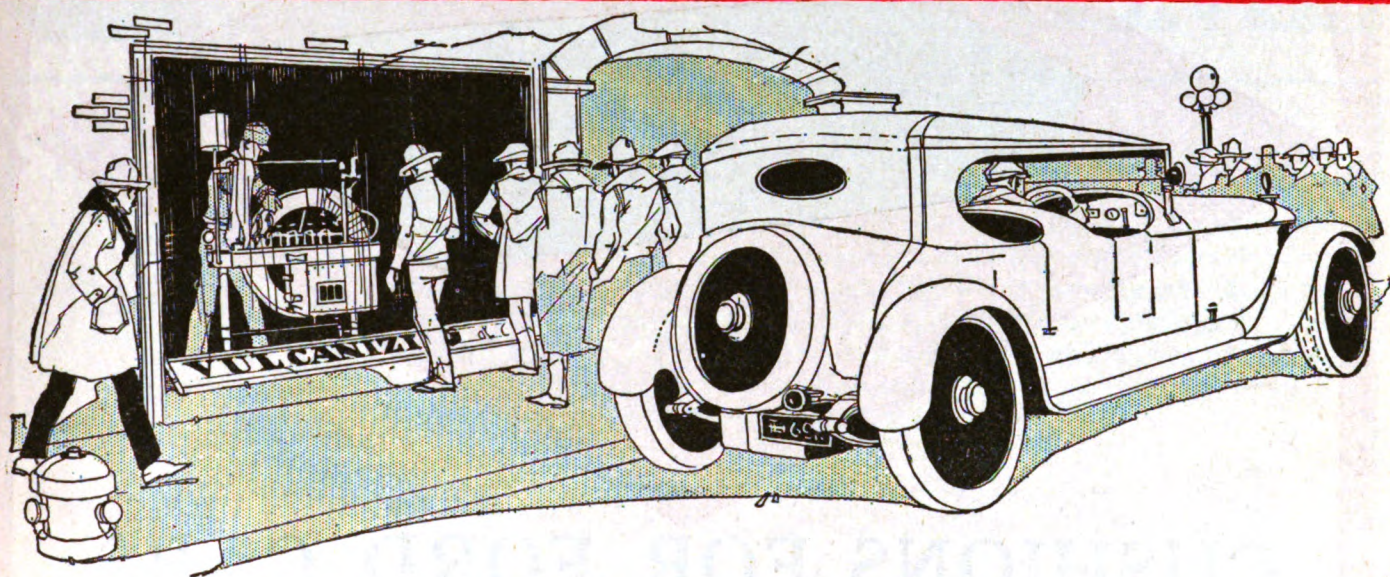


# American Garage & Auto Dealer

Published Monthly  
116 So. Michigan Ave.  
CHICAGO, ILL.

DECEMBER 1920

Vol. 11—No. 12.  
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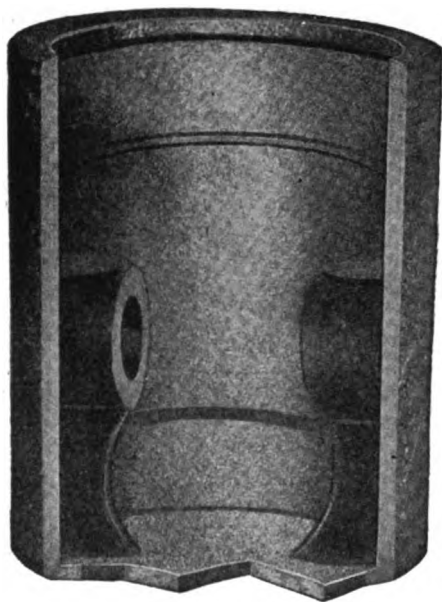
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# MARCO— The PISTON SUPREME

## It's Not How a Piston Looks—It's How It Acts That Counts

Marco reputation is built on performance. They are made of selected, close grained grey iron of the best quality and in accordance with the specifications of the Society of Automotive Engineers. Every item entering into their construction is tested—each charge in the cupola is chemically analyzed. The side walls are light but substantial—they are reinforced underneath the head and around the base. MARCO Pistons are as light as practical, as strong as required to give excess of power, range and flexibility.

## MARCO ON PISTONS IS AS STERLING ON SILVER

There may be other Pistons but there is only one MARCO—unapproached—unequaled. Do away with Piston troubles, use MARCO Pistons. Loss of compression, fouled spark plugs, piston slap, sticking, excessive pumping of oil are unknown with the MARCO.

Specify—insist upon, and use only Marco Pistons. Recommended and used by particular automotive repairmen.

## Marco Quality Unequaled—Marco Service Unexcelled

We are in position to render prompt service on Marco Pistons. We have patterns for 2,500 makes and models of internal combustion engines—from motorcycles to trucks. Marco Pistons are furnished in the rough, semi-finished or finished to the following standard oversizes: .020, .031, .046, .062.

Write for our latest pattern list at once.



*The Sign of a  
Perfect Piston*

### MARVEL MACHINERY COMPANY

510 Loan & Trust Building  
Minneapolis, Minn.



*The Sign of a  
Perfect Piston*



# "NORMA" PRECISION BALL BEARINGS

(PATENTED)

In the long run—with machines as with men—the honors go to the one with the greatest reserve to draw upon. An ample margin of safety is the surest safeguard when the supreme test comes. The test of hard service has always found "NORMA" equipped ignition apparatus and lighting generators adequate to the most extreme demands. They are standard equipment on the cars, trucks, tractors and power boats whose names stand for service.

See that your electrical apparatus is "NORMA" equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# American Garage & Auto Dealer

*Published Monthly*

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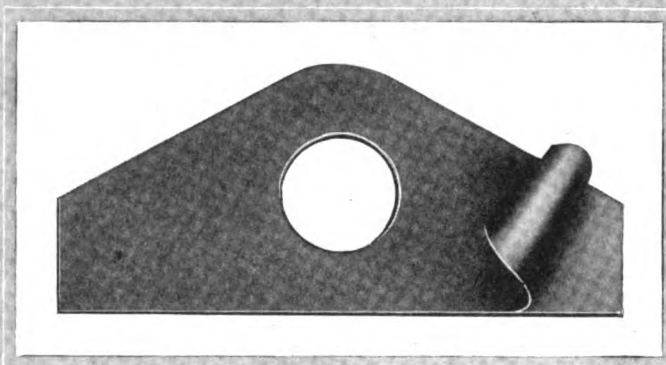


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that can be  
cut to fit



The FIT-ALL laminated shim can be cut with ordinary tinner's shears to fit almost any single-bolt bearing.

A knife blade will peel off the brass layers, .003 of an inch at a time, to the desired thickness. Clip, peel, slap it on—all done! Try it!

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# GIANT PNEUMATIC TRUCK TIRES

**BRUNNER**

The Giant pneumatic Truck Tire, admittedly a practical success, cannot gain the wide usage expected of it unless ample inflating facilities are found at frequent intervals in the cities and towns and along the main highways.

Brunner engineers have for two years worked with the development departments of the large tire makers and Brunner equipment was designed and built for this special service.

Dealers and service station proprietors are invited to request engineering data and cost figures. The progressive dealer owes this much to his trade.

In writing for information name your jobber.

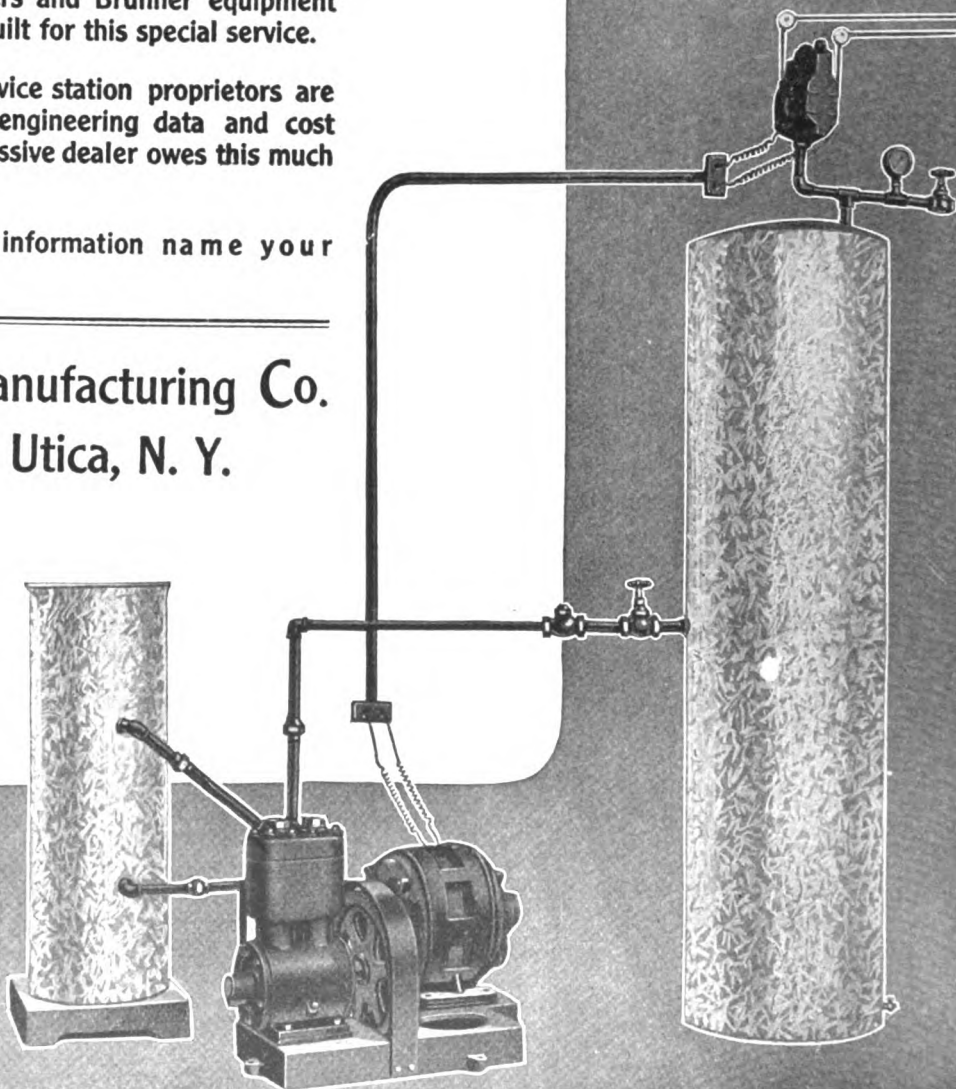
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CINCINNATI, O.

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## Not An Ordinary Oil Groove!

*Few rings have an oil groove. If the oil groove is a good thing, why are not all rings cut with them? If bad, why any?*

The answer is that ring manufacturers must either adopt the ordinary straight cut oil groove or violate Patent No. 1354287.

Now why are ordinary oil grooves inefficient? They become clogged with particles of carbon. These particles of carbon move neither to right or left. They soon prevent the movement of oil. Lubrication stops.

Patent No. 1354287 covers the wandering oil groove of the General Lightning Cut Piston Ring. Note how this oil groove rises up and up from the Lightning Cut. At the point opposite the cut, the oil groove reaches as near to the top of the ring as it is near to the bottom at the start. It then takes a downward course and ends where it started.

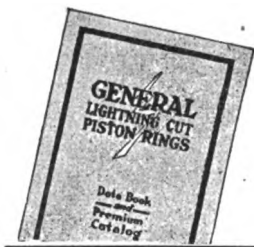
What happens to a particle of carbon? It flows *downhill* through the wandering

oil groove with the excess oil returned to the crankcase.

The wandering oil groove cannot get clogged with carbon. Accumulated particles cannot bite into the cylinder wall. Lubrication is uninterrupted; wear minimized; no little saving of oil effected and, because of reduced friction, there is a decreased fuel consumption.

There are equally good reasons for the one piece construction, the concentric shape and the individual casting of General Lightning Cut Piston Rings.

There are excellent reasons why you should specify General Lightning Cut Rings in ordering from your jobber and for introducing these rings to your customer. Send for the booklet of piston ring data and premium catalog. It was printed for you.



### GENERAL UTILITY COMPANY

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Export Department: 17 Battery Place, New York City

# General LIGHTNINGCUT PISTON RINGS



**They Always  
Come Back  
for More  
SPEE-DEE**

The best feature of handling SPEE-DEE is the permanent, consistent nature of the business that goes with it. Once a car owner has bought a can of SPEE-DEE he will sooner or later be back for another, and so on indefinitely. He finds so many uses for this wonderful cleanser that he cannot be without it.

## **The All-Around Automotive Cleanser**

Equipped with a can of SPEE-DEE the car owner can quickly, easily and thoroughly clean his top, seat covers, celluloid curtains and running gear. When through working on his car, he uses SPEE-DEE to remove the dirt and grime from his hands.

### **Cleans Greasy, Grimy Hands**

with or without water—an invaluable feature in cold weather. SPEE-DEE will not injure any fabric or surface as it contains no lye, grit or acid.

You will find SPEE-DEE not only a big seller, but also invaluable in your own shop. Dealer profits are liberal.

*Write today for complete information*

**STATES CHEMICAL COMPANY**  
680 W. Austin Ave. Chicago, Illinois





# American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,  
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XI. No. 12

CHICAGO

December, 1920

## Survive or Perish.

The greatest economic problem the country ever faced is here—and it came like a thief in the night. Of course, we knew it would come—it had to—yet its appearance throws us into consternation. The reason for the uneasiness manifest is not, by any means, the ultimate effect of the reaction, so much as the fact that the turn came about so suddenly. Most of us expected to see a gradual scaling downward until a universal level was reached. Instead, in almost one "overnight," this condition swept the country.

The right road will be found by the clear-headed, keen American business man and not by any governmental body or political organization as many have hoped. In times past, these readjustment periods have been unusually shorter and less painful than we expected to find them. Why not now?

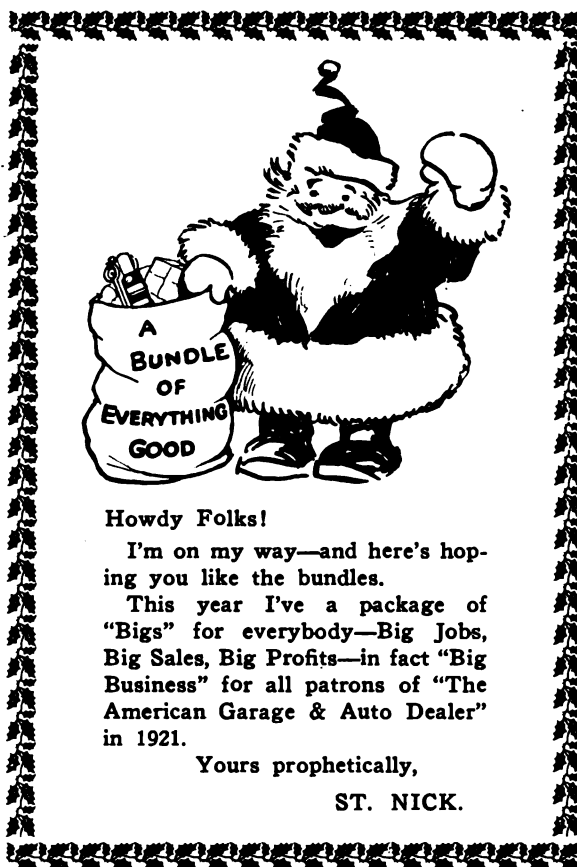
The basis of all wealth and all commerce is the products produced by the farmer. The wheat and corn crops, taken the country over, are the most bountiful in the history of the country, and business will be good if the dealer makes it good. The dealer should not stop or become discouraged for a minute.

Now is the time to advertise! The public needs and will buy

Dear Readers:

We've sent .....  
A Note .....  
To Old St. Nick.....  
And Told him.....  
To bring .....  
A bundle .....  
Of everything .....  
That's good.....  
To each .....  
Of you. ....  
Yours for .....  
A Cheery Christmas .....  
And .....  
A Year of Prosperity. ....

THE AMERICAN GARAGE  
& AUTO DEALER.



Howdy Folks!

I'm on my way—and here's hoping you like the bundles.

This year I've a package of "Bigs" for everybody—Big Jobs, Big Sales, Big Profits—in fact "Big Business" for all patrons of "The American Garage & Auto Dealer" in 1921.

Yours prophetically,

ST. NICK.

goods. It is a fact that the country's industrial machinery is slowing down slightly, but it is only temporary and there is no need for the uneasiness that is being manifested.

All the way down through the annals of history it has been the "Fighting Spirit" that wins. In this respect the same policy that works out in war, works out in business. It takes the man with courage, the man who can not be swayed this way and that with a wild, pessimistic crowd.

When the storm rages at sea, every sailor gets down to business and uses good judgment, handling the rigging and rudder with safety until the storm abates. After the storm the sea is again calm and sailing is easy. Business, right now, can be likened to a rough sea—and it is up to the keen, level-headed, American business man to realize his responsibility and steer clear of these great, magnified rocks of disaster that loom up like mountains.

Conditions are not the best by any means, but right now the trouble is, and has been for some time, that goods could be sold without effort—that is, folks just came, asked for them and took them away. At the present time they have quit coming. Dealers all over the country have not awakened to the fact that they must get back to hard work and modern

methods of salesmanship to do business.

A few weeks, or months ago, we found the dealer loafing about the office and selling all the goods he could get without going out and working for it—and this has spoiled the dealer. That is where the trouble is, and the sooner the dealer gets out and goes after the business, the quicker the economic problem is going to be solved.

Only a few days ago, the writer visited an automobile distributor of a standard make of car and made inquiry as to business conditions. He was not a bit blue over the situation and said that business had not dropped off because they didn't let it. When the so-called slump in buying came, they put forth more effort.

Business is not normal—we all know that to be a fact, of course—and it will not be for several months to come. Automobiles and automotive merchandise are moving in every instance where real salesmanship is exercised. There is but one solution for this so-called "slump situation" today—and that is work, and more work.

#### A Lesson from France.

"It was in a remote rural section of France where I got a lesson I wish Missouri could learn," said a prominent Kansas City business man just returned from a six months' trip abroad. "Ahead of us was a man past middle age, filling holes in the road with rock. He was working slowly but well, evidently believing that his task was the all important one.

"We stopped. Through an interpreter I asked the man if he had a home. He said yes. I asked him if he didn't have garden truck to tend. He said he had. I asked him why, with so much else to do, could he afford to work on roads which still were passable?

"We are too poor now to neglect our roadways," he answered. 'We must fix them up first, then we can raise and sell our products.'

"I didn't quite understand the old man even then," the business man ex-

plained. "Here we take the attitude that we are too poor to afford good roads. He was too poor to neglect them. Further travel explained it, however.

"On those roads that are repaired and smooth, a gardener or farmer will haul more produce with one horse and a cart than our farmers can haul in a wagon and team or with a small truck.

"The humblest man I interviewed in Europe taught me the greatest lesson. He knew the value of his roadways, and turned attention to them first of all."

The lesson of good roads is one that the people of this country are slowly learning. France, through necessity, has learned the lesson and America, through the necessity for transportation facilities, will also learn it. Talk good roads and more and better roads. They help community growth and community growth increases business.

#### 1921, a Good Automotive Year.

The question uppermost in the minds of many automotive men is whether 1921 will be a good year. It will be recalled that only a few months ago many believed nothing could happen to disturb the prosperity which was then existing—but it did happen.

It may be mentioned that the same factors which make a business boom possible, when given a little reverse English, can undo prosperity—and that is what precisely occurred. Yet, if business can swing from the extreme of intense activity, to that of partial activity, it is also plausible to assume that it can recover almost as quickly.

Now, when some automotive men are temporarily affected by a dropping off in business, they take a pessimistic attitude towards the outlook—can't possibly see how business will be good again. If these same men had made a prediction a few months ago as to the probable course of prices, very few would have thought that prices would slump.

At the Automotive Equipment

Show held in Chicago last month, it was the unanimous opinion of those in attendance, that 1921 would be a good year for the automotive industry. Though there was a scarcity of buying, it was apparent that both the jobbers and dealers took an unusual interest in all the exhibits. The accessory manufacturers contend that just as soon as the jobbers and dealers realize that prices can't get much lower, there will then be a belated rush to stock up.

If the situation is analyzed from the viewpoint of most accessory manufacturers, it will be obvious that the majority of these can't cut their selling costs very much, as most of their raw materials were bought some months ago at higher prices. Moreover, it has cost these manufacturers more money to produce their accessories, for labor has exacted a higher wage for its share in production.

Then from where is the relief coming? Within the past 60 days prices on many commodities have declined until Bradstreet's index shows that \$3 expended now will purchase about \$3.75 worth of merchandise. Wholesalers and retailers have liquidated accumulated stocks, under pressure from their banks, with the consequent benefit of materially easing up the credit condition.

Money is, therefore, more plentiful now than it has been for some time. When money is available for the promotion of activity, business inevitably improves.

It is interesting to note that prominent business men, whose opinions are held in high regard, because they are known to be conservative in their views, are prophesying a good year for 1921. Among those who share this belief are J. B. Forgan, president of the First National Bank, of Chicago, and the dean of American bankers and Judge E. H. Gary, chairman of the United States Steel Corporation.

Now is the time to prepare for good business. If your stocks are low, replenish them so there will be no delay in giving "good service" to customers.

# N. Y. Show Mirrors Bright Future

The First Big Mirror of the Automotive Industry Is the New York Show—  
Unlike Coming Events Which Cast Shadows Before Them, This Mirror  
Reflects the Brightest of Futures for Every Branch of the "Big Game"

Under the expert guidance of S. A. Miles, general manager, the gigantic New York Automobile Show—the 21st annual exhibition—is being whipped into shape for the opening date—January 8.

Nearly 400 exhibitors of motor cars and motor car accessories will have their "master" products on display. And of this vast total, 88 manufacturers will show cars. This does not mean that there will be only 88 automobiles on display, for each manufacturer will show several models. Models for every pocketbook will be there—limousines for millionaires, touring cars for the man who has not made his million yet, and runabouts for the man who expects to make less than a million.

There was such a demand for exhibit space that after the allotments had been made, General Manager Miles had his engineers carefully go over the floor space. This check-up revealed that two more motor car exhibits could be accommodated, bringing the total up to 88.

Every inch of the 200,000 square feet on the four floors of Grand Central Palace that could be utilized has been taken. So great was the demand that many accessory concerns had to be left out.

This large number of exhibits not only sets a new record for the New York show, but indicates that the trade is taking an optimistic view of the future.

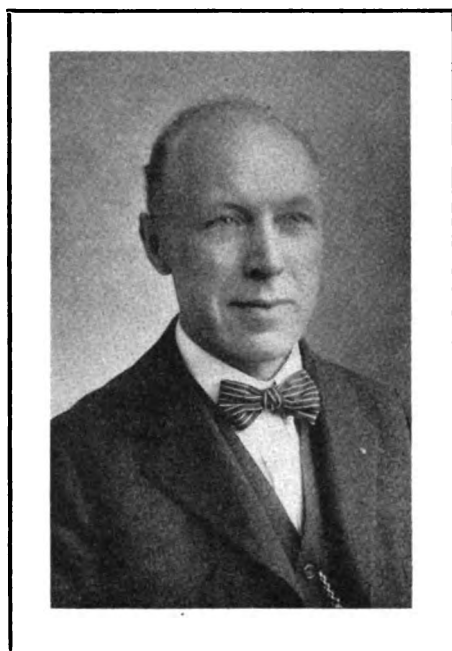
Manufacturers and dealers are co-operating energetically. Reports from factory chiefs are to the effect that the outlook is brighter than several months ago, and the exhibitors expect to do a big business. Evidence that the buying public is again in the market is apparent to those who have their ears close to the ground.

It is expected that there will be more than 350 passenger cars of various styles on exhibition—and this means the widest range of automobiles ever shown under one roof. It will be a representative showing of the third industry in the United States.

There, will be seen makes of cars

never before exhibited in New York exhibitions—some making their first appearance at an automobile show. The new additions to the motor car exhibits include the Cortlandt, du Pont, Friend, Gardner, Hanson, La Fayette, Lincoln, Lorraine, Noma and Piedmont.

Only those who attended the first automobile show ever held in this



S. A. Miles is the Power Behind the Throne  
in the Big Show.

country—back in 1900, when motor cars were considered almost freaks, and, in fact, when compared to present day models, were freaks—can realize the wonderful strides made by the automotive industry. Then—there were no palatial limousines, no stately sedans, and no rakish-looking touring cars. Just models that proved some far-seeing business men were awakening to the beginning of what now is the third largest industry of the country.

The automobile show means much to the manufacturer, to the dealer, and to the prospective car owner. To the manufacturer, it offers an opportunity to display to the motoring public, in the most persuasive manner possible, the care, the labor, the expert detail exercised in the production of the motor car of today. To the dealer, it

affords a chance to judge at one time the relative merits of practically all of the leading automobiles of today—to choose those best suited to his customer's needs.

And to the intending purchaser, it is a vast panorama—where the beauty of line, engine efficiency, comfortable riding qualities of the modern motor car are demonstrated to him in a way that is impressive and at the same time better enables him to choose with intelligence when he is ready to buy.

And so the New York Show, a twin brother of the Chicago exhibition later in the month, held under the auspices of the National Automobile Chamber of Commerce, has become a national institution. Not only do manufacturers and dealers vie with each other in staging an exhibit of beauty, but there is a practical side to each display.

The latest models, of course, are shown, and while body design makes a car attractive, it is the engine to which manufacturers are now turning their attention. There have been many improvements in body designs, but automobile builders learned many lessons during the period factories were turned over to the government for the purpose of manufacturing war materials. Some of the most improved features in engines came as a result of these experiences, and such betterments will no doubt attract at the coming exposition.

Four floors in the Grand Central Palace, each floor a city square block, furnish the setting for the exhibition. Not for the present will the management divulge just what the interior of the great building will look like, but it is certain that the lighting and color effects will be brilliant, and will, as always, make a setting that will reflect the displays to wonderful advantage.

The number of accessories to be shown at the coming exhibition will break all records. And a feature that will appeal to the public is that every car on exhibition, and practically every accessory, will bear the "Made in America" label.

The accessory displays always at-

tract for there are many new inventions constantly making their appearance and automobilists spend a lot of time at the shows looking at these features and inquiring into their merits.

Some idea of the interest in the national motor car expositions this year can be had from a statement by Mr. Miles who says that the applications for exhibitors' invitations for New York received thus far show an increase of approximately 50 per cent over last year, while for the Chicago show, starting January 29, the demand for the tickets is greater by more than 30 per cent.

Dealer, manufacturer and customer will focus their eyes upon the great exhibition January 8-15, for this season, more than any other year, they want to know how it is received.

The dealers and manufacturers will largely shape their plans for future business upon the interest shown by the general public in the show and that reception will have a psychological effect upon the prospective car purchaser who does not attend.

The outlook in the automotive industry for 1921 is most encouraging. Despite depression evident at certain periods of this year, next season will show a wholesome recovery for the weak spots have been found and where not entirely eradicated, have been strengthened. Predictions are freely

made that there will be a great sale of cars and accessories at this New York exhibition.

From all parts of the country, reports are coming that the automobile buying public has again entered the market. This upward trend to the demand for cars was a feature of the first automobile show of the Hudson County Automobile Trade Association, held in Jersey City recently. Here 85 cars were actually sold off the floor while the exhibition was in progress, which is a new record for a dealers' show in a community the size of Jersey City.

So every indication is that the year 1921 will be a big year. Those who do not have the opportunity of visiting the great exhibitions can at least benefit by some of the encouraging reports of brilliant business success that will radiate from them.

### **Thirty Thousand Motor Vehicles Serve the State Governments.**

According to recent reports issued by the National Automobile Chamber of Commerce, various departments of the governments of the 48 states are being served by 30,000 cars and trucks. Twenty-three thousand of this total are trucks and automobiles used by the states for the improvement of highways. About 4,500 of the remainder

are passenger cars which the authorities have purchased for the needs of official business.

### **Date of Sixteenth Annual Automobile Show of Omaha Announced.**

The week of March 14 to 19, 1921, is the time the Omaha Automobile Trade Association announces for its 16th annual automobile show. C. G. Powell, secretary of the association, has been appointed manager of the show, which promises to be the largest and best that has been put on by the organization.

### **First Highway Transportation Show to Be in New York City.**

There is promise of great educational value to be gleaned at the New York highway transportation show, to be held in New York City from January 3 to 8, 1921.

As highway transportation is playing a more and more important part in the life of the nation, this announcement is one of particular importance. The show will be held in two buildings—the 12th Regiment Armory, at 62nd street and Columbus avenue, 200 feet off Broadway, and at the First Field Artillery Armory, 68th street and Broadway. Each of these buildings has a floor space of approximately 25,000 sq. ft. available for exhibits.

# **It's the "Go-and-Get-It" Spirit Now**

**The Great Automotive Equipment Exhibit Held in Chicago Brought Out, Among Other Things, the Need for "Going After" 1921 Business—It Was Not a Buying Show, but It Furnished Many a Fine Lesson in Sales Education**

Do you remember "way back when" the first automobile shows were held? If you do, you will recall that alongside the cars on exhibition, there was a scattered display of accessories such as spark-plugs, and headlamps and the like. There was no attempt at an organized display of such articles, nor was there any such thing as an organized exhibit of garage equipment and machinery.

Those were the days when the term "automotive equipment"—that is, machinery and tools to be used in the maintenance of automotive vehicles—was in obscurity.

But those attending the Automotive Equipment Show, held in Chicago, November 15 to 20, realized that no lon-

ger were jobbers and dealers unaware of the possibilities in this branch of the automotive industry. For there was an exhibition of products designed to fully equip a car for efficient service, and to make the task of repairing it satisfactory and complete.

Those who owned automobiles have realized that if they are to have up-to-date cars they must have up-to-date and convenient accessories, and those who repair automobiles have come more and more to see that hand work is not the means by which to speed up any particular operation.

More frequently the visitors at automotive equipment shows are given a chance to see the ease and rapidity with which cars can be taken apart

and put together again by means of special tools and equipment.

Labor-saving equipment always pays for itself in the long run, if not in cash profits, in time and labor saving that it makes possible. For machine equipment in a garage, like a tractor in the field, never gets tired and is always on the job.

Six hundred jobbers and manufacturers were in attendance at the Coliseum. As some expressed it, it was a wonderful assemblage of automotive merchandisers and automotive merchandise—but it was not a buying show.

Although new products and old products were most favorably received and there was buying to a certain ex-



tent, in reality those who were exhibiting, gave their time and attention to teaching the arts of salesmanship—for it is to “go and get it” methods to which the automotive industry is now turning in its effort to clarify the business atmosphere. The selling organization is now due for a full share of the attention in the big-business drive in the spring of which there is every indication.

The mornings of the convention week were devoted to business meetings and the afternoons to the general exhibition.

At the opening meeting Alfred Reeves, general manager of the National Automobile Chamber of Commerce addressed the assembly on the “Future Prospects of the Automobile Industry.”

In regard to the upward movement in the automobile business, Mr. Reeves said:

“Along with other industries we have had poor sales for two months, but the automobile business is now moving upward. Present production is not averaging more than 50 per cent, except in the case of three or four factories, but the full year will exceed all records, approaching 1,900,000 cars and 340,000 trucks. Car renewals are about 1,000,000 a year.

“It was logical and healthful that a business which increased 350 per cent in five years, should have a readjustment along with other industries.”

Senator Medill H. McCormick also spoke and urged automotive men to lay their problems and needs before congressional representatives. Senator McCormick urged the repeal of the excess profits tax and stated he thought it wise that instead of repealing it all at once, legislation be enacted so that half of it would be cared for in one year and the balance the following year. The senator considered this a better medium than compromising upon some undesirable mode of legislation that might endure for ten years.

Jobbers at the convention reported that although business was somewhat below normal, orders were smaller and more frequent. One manufacturer reported 300 to 350 invoices a month instead of 175 to 200 in the same period of time early in the summer for the same amount of business.

The matter of price reductions and buying received considerable atten-

tion. The jobbers wanted manufacturers to cut prices or guarantee them. Although the manufacturer members declined, it is thought that individual members might take action in the near future. It is expected that such action would have the wholesome effect that it has had in the past in clarifying the sales atmosphere.

The delay in buying on the part of jobbers was due to the expectation prevalent in other lines of business

### **The Fighting Man's Creed.**

**Don't whine! Endure what you can't alter. Get over the hard bits of the road by pushing forward. Never know when you're licked. Never be elated when you've won. Whether you win or lose, don't sit down; seize on the next most difficult thing that you may conquer. For it's not the winning or the losing; it's the eternal trying that counts.—Coningsby Dawson.**

that prices would fall. Manufacturers hesitated to bear the burden of price reduction.

The Automotive Equipment Association for the first time this year chose a manufacturer for president. R. A. Stranahan, president of the Champion Spark Plug Co., Toledo, Ohio, This will be a forward step in strengthening co-operation between jobber and manufacturing members of the association.

A legislative committee was appointed to co-operate with other business organizations for a favorable readjustment of federal taxation. And among other announcements the good roads and highway's committee of the A. E. A. stated that plans for active work had been made.

An important step taken by the association was that of “going wholesale only.” Hereafter, no jobber doing other than a wholesale business may become a member of the association.

Announcement of dates of future meetings was made. The summer meeting is scheduled for July 4-9 at Mackinac Island, Lake Michigan, and the 1921 convention and exhibit for November 14-19 at the Coliseum, Chicago.

About the whole convention there was a general atmosphere of encour-

agement. The expression of confidence in future conditions was to be noted everywhere. As Mr. Reeves declared in his address, there is a great future for the automotive equipment branch of the industry, in fact, only half of the cars in use at the present time have all the equipment they should have to operate with full efficiency.

And last but not least, the attitude of those present is worthy of comment, for it is bound to have an effect upon the business situation throughout the coming year. It was that “If you can't say something good about the industry, don't say anything.”

### **Early Linking Up of National Park-to-Park Highway Approved.**

At a well-attended meeting of the executive board of the American Automobile Association, recently held at the association's headquarters in Washington, unanimous approval to the early linking up of the National Park-to-Park Highway was given.

As the ever-increasing number of road tourists visited the National parks during the past summer, it was realized that these playgrounds of the nation will not serve their maximum purpose until highway connections are established of such character as to make it possible for the traveler to plan his journey successfully and conveniently.

Even if Congress dissents from granting a specific appropriation for connected roads to these scenic and recreation areas, it is certain that the states will see to it that their apportionments of federal road money will not disregard this important work, besides which, in some instances, even the counties will be helpful in the premises.

### **First Successful Motor Car in Washington Museum.**

The Museum at Washington, D. C., now contains the first successful “horseless carriage” in the United States. George B. Selden, a young attorney of Rochester, N. Y., obtained the patents covering the propulsion of the vehicle, besides the various means to regulate its speed, steering and starting.

The three-cylinder internal combustion engine is just above the front axle. Practically the whole transmission system was centered at this spot.

# Servicing Trucks—Selling Tractors

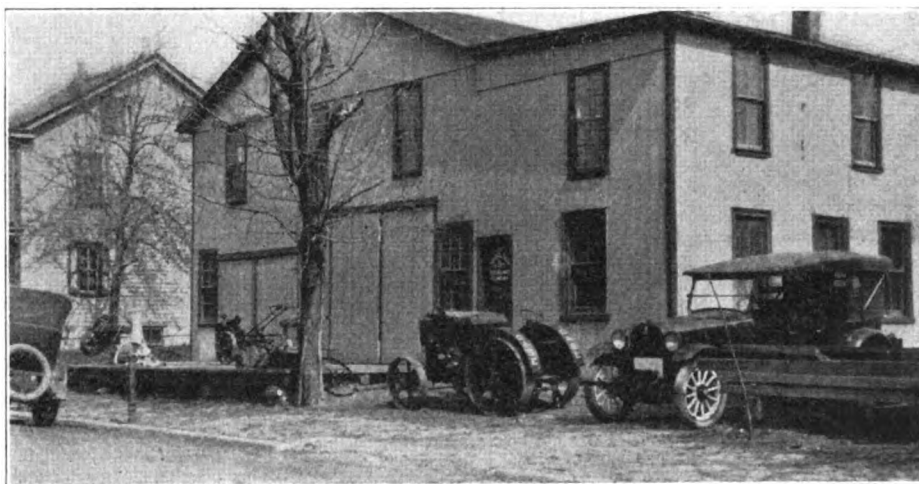
Something More Than a Bit of Loose Change Can Be Picked Up by the Garageman Who Caters to Truck Owners—Tractor Selling Is Also Lucrative—Even the Humble Trailer Has Value to Garageman as a Storage Proposition

By K. H. Lansing

As soon as the small-town garageman, or automobile dealer, gets the idea out of his head that a garage is a place to store and service passenger cars only, he usually finds his pocket-book growing fatter.

There are enterprising garagemen—ordinarily not more than one or two, however, to a good-sized community—who realize that there is something more than a bit of loose change to be picked up in catering to truck owners, for instance. Most truck operators, especially those just starting in business, and the proprietors of growing fleets of commercial cars, are glad to know where they can house their machines and have good care taken of them.

Certain kinds of business requiring trucks sooner or later, are quite likely to add a trailer or so. It is no uncommon sight, nowadays, in very small towns, to see trucks hauling trail-



An Outdoor Showroom for Tractors and Other Motor Vehicles in a Farming District.

ers. This is especially true in the lines of machinery, steel and iron, sewer pipe, stoves, lumber, and milk. The smaller the town, the easier it is to learn how many and what dealers there are in these lines of business and to circularize, solicit, and follow them up.

Trailers are always a good storage proposition for the garageman, because, on account of their short wheelbase, they take up comparatively little space and because they require virtually no care.

Furthermore, the small-town gar-

ageman is particularly well situated to have a tractor agency—he is in a position to give the farmer real service, especially if he has a service car and can rush out parts for tractors that have broken down, or in an emergency bring the tractors into his shop, or the shop which does his business. This is the great handicap of the

big city tractor agent—his inability to give really quick service to the farmer.

After all, it is quick service that the farmer seeks, for a broken down and useless tractor in his field at harvest time, means money lost. But the

**COMMERCIAL GARAGE**  
Formerly One Station Garage  
Lincoln and Holly Beach Avenues  
Cape May County Agents for  
**NASH CARS -- NASH TRUCKS**  
Fully equipped machine shop for Automobile  
and all Engine repairs.  
Under the Supervision of  
**A. J. INGERSOLL**  
WILDWOOD, NEW JERSEY

An Advertisement for a Commercial Garage.

small-town tractor agent—and the garageman is the logical tractor agent there—is virtually on the ground all the time, or with the aid of a service car, can be at the farmer's service in jig time, with parts, or tools, or both.

When a small-town garageman has taken a tractor agency, he should keep this fact of ability to render quick service ever before the farmer, and he can teach the farmer that certain types of tractors are as useful after harvest, with general belt work, filling silos, scraping roads, sawing wood, and plowing snow, as they are before cold weather.

He can even offer to house the farm-



Such "Freak" Vehicles Afford an Excellent Storage Proposition.

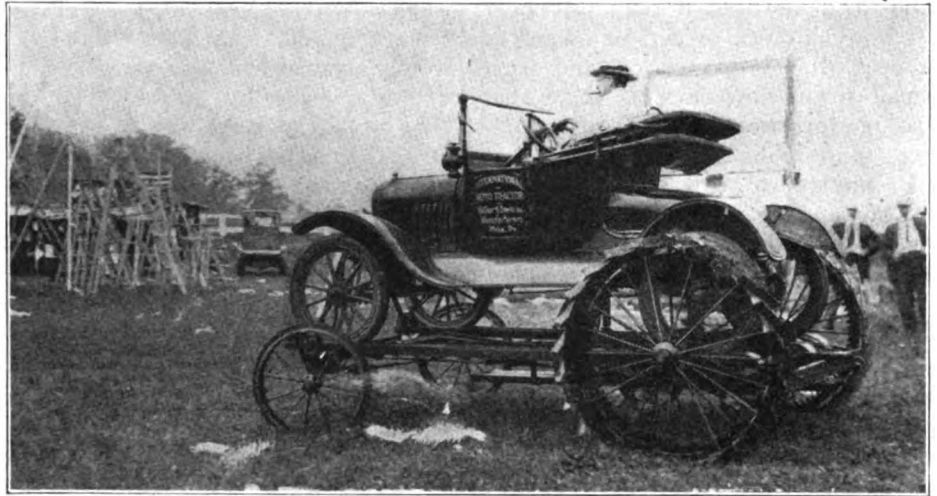
er's tractor for him in his garage, charging an equitable rate for the space it takes and for whatever care it needs. Many a farmer has no proper place to house his tractor, and by keeping it in the open, or under a ramshackle shed in winter, has just about ruined it or, at least, unduly hastened its depreciation.

Now and then a garage can find, in addition to trucks, trailers and tractors, some such "freak" automotive vehicle to house and service as the "auto-horse," or the "auto-tractor." The former is particularly useful in hauling heavy loads in narrow passageways where trucks or horses can not turn, this machine turning almost at right angles to the trailer or wagon it hauls, and being shorter than a horse. The latter is a tractor frame of special design, on which is mounted a Ford, or other passenger car, by whose power the vehicle is propelled.

not nearly as many as the richness of the field affords. In fact, there are not enough passenger car garages in Pennsylvania, as has been demonstrated for the last two years when

nearly all available garages have been jammed to overflowing and turning away custom while trying to urge builders to hasten additions.

There are lots of opportunities,



The Garageman Can Make Some Money "Wintering" This Freak—the Auto-tractor.

|                                    |               |                   |
|------------------------------------|---------------|-------------------|
| Date.....                          | OWNER OF FARM | No. of Acres..... |
| .....                              |               |                   |
| Address .....                      |               |                   |
| Location .....                     |               |                   |
| FARM SUPERINTENDENT                |               |                   |
| .....                              |               |                   |
| Address .....                      |               |                   |
| Prospect for .....                 |               |                   |
| Interested in what other Machinery |               |                   |
| .....                              |               |                   |

Tractor Prospect Card Measuring 4x9 Ins. It Fits the Index Cabinet.

Occasionally, the former is found in a small town, usually in the same line of business appropriate to the trailer, but it is more useful in cities with narrow alleys and store passageways, than in towns of few buildings. The "auto-tractor," however, is a genuine country machine, operated by the farmer's pet "tin Henry." Agencies for this have been found desirable, the same as with any tractor, or "form-a-tractor" outfit.

Thus, it is readily recognized, the commercial garage, or mixed garage, is not by any means a city institution. New Jersey harbors a good many, though scattered over a wide area, rarely more than one or two to a community. Pennsylvania has a few, but

doubtless, in every state in the Union for alert garagemen who are willing to stray a bit from the beaten path.

Often the commercial garageman starts by being an agent for some make of truck. He then, of course, prepares to give service to these cars and soon enters the general servicing and truck garage field as a natural and logical step. Sometimes this is possible without having a complete machine shop, the plan in such a case being to have an arrangement with a regularly-equipped machine shop, with heavy drills and the like, and to maintain in the garage only sufficient equipment to do ordinary light servicing.

Such garages, sooner or later, are apt to become full-fledged dealers in accessories, parts, oils, gasoline and greases, utilizing at least a small part

|                                            |                         |
|--------------------------------------------|-------------------------|
| Recommended by                             |                         |
| .....                                      |                         |
| Circulars of following machines were sent: |                         |
| .....                                      |                         |
| .....                                      |                         |
| .....                                      |                         |
| .....                                      |                         |
| Called on .....                            | Machine now in use..... |
| Remarks: .....                             |                         |

The Reverse Side of the Small-Town Tractor Prospect Card.

of their place of business for display and sales.

The commercial garageman must have his assistants on their toes in the early morning hours, as the trucks probably will have to be made ready and taken out earlier than passenger cars. The truck owner, or owner of a fleet of several trucks—and what small town, nowadays, is there that has no such fleet owner?—often prefers to have his drivers, if they are of a mechanical turn, do some pottering about the place, tightening nuts and bolts, oiling, and the like to suit themselves, irrespective of whether such work is taken care of in the contract with the garageman. And he is a wise garageman who does not offer any objections to this procedure.

Washing commercial cars in one way, at least, is an easier proposition

the old-time divisions of "live" and "dead" storage, there has been developed comparatively recently, the "semi-live" variety, which is almost self-explanatory from its title.

One commercial garageman in a small town in New Jersey, not far from Camden, uses the "semi-live" storage system as follows:

For a charge of \$2 less than the "live" rate, he keeps the truck clean on the inside; brushes or wipes it off lightly on the outside each night, and thoroughly washes it once a week.

He asserts that this plan pays him better than the higher rate "live" plan, because of the lighter labor charge, which is a considerable item nowadays to all garagemen, and that it is more satisfactory to the truck owner, because of the good appearance of the truck for a comparatively low charge.

ers. Here, in the garage, business is already at hand, with persons who know and can rely upon the garageman. In larger garages, sometimes the owner of the place has the night manager, or some other employe, make the nightly inspections of the trucks and leave a report on his desk for him to see in the morning.

A good plan to follow, that is sure to be appreciated by the truck owner, is to telephone the owner or chauffeur at least one hour before it is time for him to use the truck, should anything serious be the matter with the vehicle or any part of it, so that there may be a chance to fix it. This could be done, for instance, in the case of a pneumatic tire that threatened to wear through, or blow out before much further usage.

Usually insurance laws are such that customers should not be permitted to lock their trucks while stored. Were they locked, it would be either extremely difficult or virtually impossible to move them to safety should a fire break out in the garage. A general blockade of customers' cars on the floor would doubtless mean great damage, or complete destruction to the building, to say nothing of the trucks themselves.

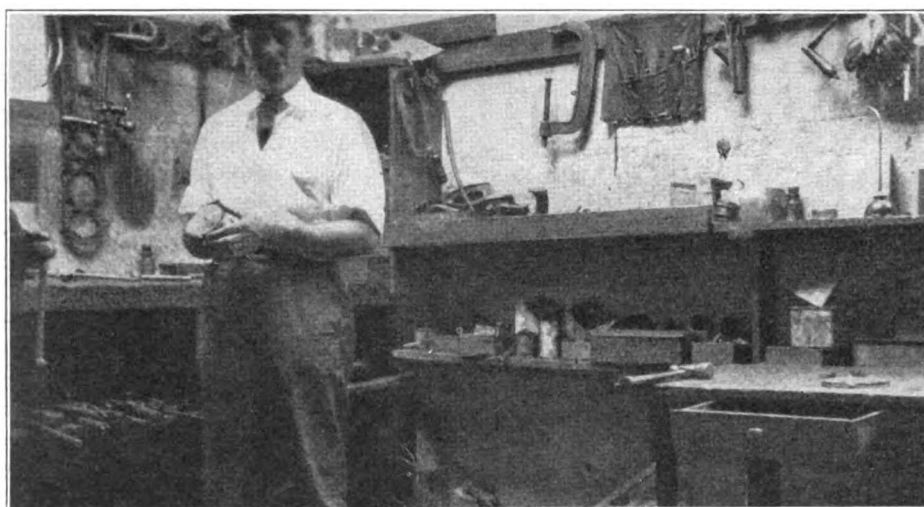
Garagemen, especially when first starting in business and intending to make light repairs and adjustments on trucks, often inquire as to what should constitute a fair inspection. A good monthly inspection plan, which is an added attraction to most truck-owners who are looking for a place to store their vehicles, is as follows, including service repair work of a light nature:

Thoroughly clean and tighten the motor and lubricate; adjust and grease steering wheel and gears; lubricate and adjust clutch and brake pedals and rods; examine and pack all universal joints; clean and fill grease cups; examine and pack transmission and differentials and inspect and clean ignition.

Tires should be inspected for abrasions, holes, and thinness of casing.

Some commercial garage owners chart their space, making each space correspond to certain dimensions, where certain types of truck will best fit. Slips of pasteboard of some bright color can be used to place in the spaces marked plainly on a white pasteboard base, the whole held tightly down by a glass plate for a cover, the colored pasteboard slips representing

(Concluded on page 20.)



A Good Machine Shop for Light Repairs is an Efficiency Adjunct.

than washing passenger cars, for the reason that when it is once begun, usually late at night, it can be pursued without interruption. When a commercial car has been "stabled" for the night, it is not ordinarily taken out again. Every garageman knows this cannot be said of automobiles.

The alert commercial garageman, too, does not lose sight of the fact that through the purchase of large quantities of oil, gasoline and grease, he is able to obtain a good discount—sometimes on truck accessories, too; and thus he is enabled, if satisfied with a small profit, to offer his customers particularly tempting prices on these commodities. This gives him an almost "ready-made" clientele.

Of course, it is more or less of a problem for the commercial garageman to decide what sort of storage he is to merchandise. In addition to

"Live" storage at this garage means three or four washings a week and the tightening up of all loose bolts, nuts, screws, or parts.

"Dead" storage implies a simple "take-in and take-out" proposition for the truck owner, and "it-goes-as-it-lays" basis for the garageman.

The careful and ambitious garageman will examine, or have examined, nightly all the trucks of his customers, including parts and tires, so that he may be able, not only to warn the owners should anything be in bad condition, but also to be able to make suggestions which may put him in the way of selling them something.

The opportunities here are almost unlimited. Think, for instance, of the many salesmen who go around with notebooks, keeping tab on strangers' trucks which look dilapidated, that they may be able to look up the own-



# A Safe Place in Which to Do Work

The Fact that an Employer, Under the Compensation Acts, Is Bound to Pay Compensation When Accidents Take Place, Does Not, According to the Safety Appliance Acts, Excuse Him from Trying to Prevent Such Accidents

By Chesla C. Sherlock

One of the liabilities which the old common law imposed upon the employer was that he must furnish the workman a safe place in which to work and reasonably safe tools and appliances with which to carry on work.

While the common law might so hedge in the workman by restrictions intended to protect the employer in case of legal action, it was very strict in this particular and never permitted employers to escape the full penalty of the law for failing to provide safe tools and safe appliances for the use of the workman, as well as a safe place in which to carry on that work.

Just what was intended by the expression, "a safe place in which to work," was largely a matter of conjecture and rested in the judgment of the courts in specific cases. The employer had no means of knowing just what a court might say in regard to the place of work and the appliances which he had furnished. What might be held safe in one case, might be deemed unsafe in another.

Out of this there grew the rule, which obtains in a limited sense even today, that if the employer had furnished the tools and appliances adopted by the average man in the same trade or calling, and had a place in which to work as good as the average in the same trade or business, he would be deemed to have complied with this requirement of the law, in having furnished "a reasonably safe place in which to work."

One can readily note that this meant that the welfare of the employees would be safeguarded, not as fast as the intelligence in that particular trade or calling as to safety appliances and tools developed, but only as fast as such tools, appliances and places of work were adopted or improved by the average employer in such trade or business. If the average were unprogressive and backward, an individual employer could hide behind that fact and escape liability.

Such a weakness in the law was early destined to be modified. It was manifestly an abuse of the intent of the law to afford the utmost, so far as

was consistent with reasonable business sense, in protection to the workmen in a given employer. It was never intended that the law should put a premium on obsolete equipment or methods of factory construction by encouraging employers to stay behind the times in order to profit before the courts. An employer under that construction of the law could continue to use old equipment, if others in his trade were doing it, and still be held to have furnished reasonably safe tools, appliances and places to work.

And so this particular portion of the common law came to be modified by statutes which undertook to define beyond doubt just what the employer should do in regard to furnishing

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**Every man starting out in business will have to go over a hard road and find out its turnings for himself. But he need not go over his road in the dark if he can take with him the light of other men's experience.—John Wanamaker.**

---

tools, appliances and a place in which to work. It sought to make it unprofitable for the general average of equipment in a given trade or calling to lag behind the progress made by the best minds towards making the place of work and the tools used as safe as possible.

First, we had the safety appliance acts, the factory inspection acts, and the various other statutory expressions designed to furnish, indeed, a reasonably safe place in which to work.

The safety appliance acts are particularly familiar to all employers. They are admittedly designed to serve one end and that is to prevent accidents and industrial wastage of workmen due to the use of tools, machinery and other equipment necessary to carry on the employer's trade or calling. They provide that various machines and appliances shall be guarded and so protected that it shall be next to impossible for workmen using them to become injured by them or maimed.

The employer must go just as far as the safety appliance acts go in spe-

cifically setting out the measure of protection which he must exercise on specific machinery. And, in order to stand before the courts "with clean hands," he must go even farther than that.

It should be kept in mind that the common law is abrogated only insofar that the statute specifically takes its place. If the statute is silent in regard to a specific form of protection which the other men in the same trade and calling have already adopted, the employer would be in a dangerous position not to adopt that form of protection, for he is still bound by the duty to provide a reasonably safe place, because the common law has not been abrogated in that particular.

Since the courts have been moved by the evident intent of the law now to save every life and every loss possible, the employer would find them more disposed now than ever before to read the intent into the law and to heap liability upon him for not doing all within his power to stop injury and loss to his workmen.

Many employers are continually raising the question: "But we don't have to pay any attention to the safety appliance acts now that the workmen's compensation acts have been passed. If a workman is hurt, we have to pay him damages regardless of who was to blame for the accident, so the workmen's compensation acts abrogated the safety appliance acts."

This is not true, and the employer who falls into this error is in for a sad awakening some day in court. The safety appliance acts apply to the prevention of injuries and accidents and, because the law is trying to do that, does not free the employer from paying compensation, if an accident *does* happen to occur. Likewise, the fact that an employer is bound to pay compensation when an accident takes place, is no basis for the reasoning that he doesn't have to try and do all he can to *prevent* those accidents in taking place. Both acts work to the fullest advantage of the employer, for an ounce of prevention is still better than a pound of cure.



# Keep the "Thinker" Running in High

When Difficulties Present Themselves, the Creative Dealer Will Always "Find a Way"—He Keeps His "Thinker" Working—From Coast to Coast It Is the Same—The Successful Man Makes the Most of Every Opportunity

By C. A. Goddard

The non-creative automobile dealer will resign to the inevitable when some condition presents a difficulty. To others such circumstances only serve as a stimulus. Take the case of Harold L. Arnold.

There is no sight more uninviting than the front of a site where a new building is being erected. Sometimes such a view just about causes the business man who is building a new home for his business to close up the temporary stand and quit for awhile.

But that was not the way that Harold L. Arnold, located in Los Angeles, felt about it. His temporary quarters occupy a little, rough crack-in-the wall. And even if his new automobile home, when finished after about 10 months, will arouse the admiration of thousands who pass that way, the present sight would be far from prepossessing. But Arnold and his sign man devised a way to not only remove the unsightly appearance of the scaffolding, and to cause people to talk about the new plant, but to actually bring people out of their way to see it. Incidentally, they made a record.

That record is in having in use the largest advertising arrow. A huge arrow in blue with yellow letters, some portions of which are outlined above the shaft of the arrow, points to the little store which he is occupying temporarily.

And few people miss it. The arrow measures the full front length of the new site, 242 feet. Its shaft is five feet high. It is seen from every direction and brings the eye right down to the point.

E. J. Filiatrault is president of the Mutual Auto Co., Duluth, Minn. Last winter he protested a paving proposition—and did it publicly. That sounds strange when said of a man who is supposed to be interested in municipal improvements, especially since he is interested in the sale of automobiles.

But after reading the text of his protest as printed, one has to admit that it is an example of publicity for the car he sells—one of the most heav-

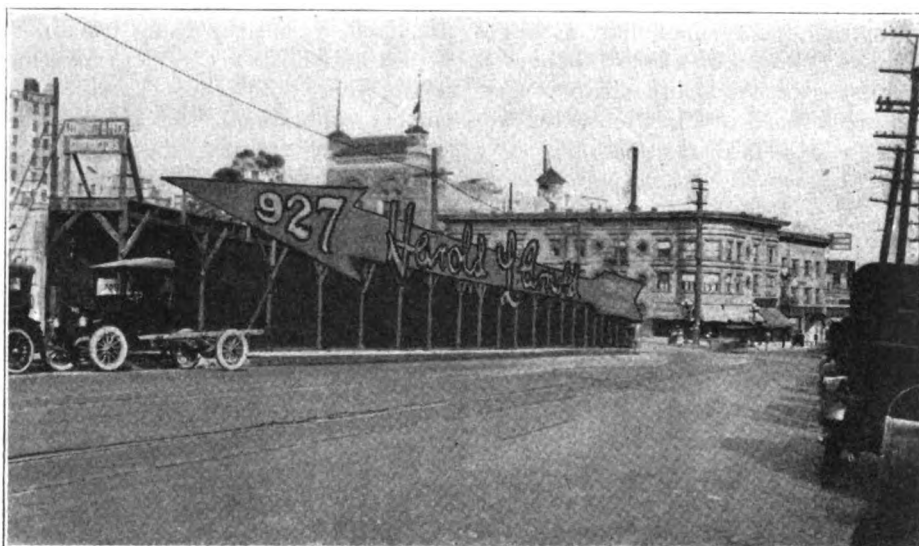
ily-advertised cars in the country. Here is his protest:

"I fully respect the views of the citizens of Duluth and the property owners who wish the pavement com-

plete from one dealer in that city he is interested in the signature:

*Car-A-Day Cummins.*

For that is the style of signature to advertisements, circulars, letters, and



The Arrow Points the Way to Arnold's Temporary Quarters.

pleted at the earliest possible moment. But in the paving of the London road it will mean that we will be robbed of one of the important factors which means much to the success and development of our business and particularly the sale of the ——— car.

"London road, in its rough condition, is the ideal type of road for demonstrating the easy-riding qualities of the ——— car. You can readily see that it will militate against us if this road is paved. We will be forced to build a rough road which will cost us considerable money, to say nothing of the great inconvenience, loss of time, etc. Hundreds of prospective purchasers will be robbed of the pleasure of riding over this road with the same ease that any other car rides a paved street, if our protest is not heeded."

Although, aside from smiles all around, the board of city commissioners failed to heed the protest, the Mutual Auto Co. got returns in the publicity which it created.

When the prospective purchaser of a car in Redding, Cal., receives a cir-

cular of printing the firm name on stationery. And it has been good publicity for the man in a number of the northern counties of the state. Besides, it's a title, or nickname well-earned by H. O. Cummins who wears it.

In the older days, Mr. Cummins thought that to take it easy and sell a couple of hundred cars a year was to establish a record. But in the latter part of 1917, he decided to sell 365 cars in 1918. He did not keep the project under his hat, but ran a full page advertisement in a local newspaper, announcing the goal, using so frequently the phrase, "Car-a-day," that the Redding people hung it onto him. And he capitalized that interest.

When he saw that this was interesting to the public, he put a bulletin on his wall near the window. This showed the daily sales with the name and address of the purchaser and the kind of car. He let the people see that there was something besides mere talk in the phrase. Some days it meant hard work—but by the end of the year, 441 cars were sold. It would have been more than that, but for the epidemic

of influenza starting in the fall, which slowed up sales for four months.

"It was surprising," said Mr. Cummins, "to notice how the people caught on to this plan. We were right in the main thoroughfare of the town, and hundreds every week would come up and peek in to 'check' us up on our record. This year we are going after two cars a day—but the old nickname, 'Car-a-day,' still hangs on. It has meant being on the job 15 hours a day, but we have a reputation that sells cars for us as far away as 400 miles."

In one of his windows, a Hollywood, Cal., garageman has a large city map mounted on a board that rests on an easel. As many visitors pass and are in need of directions, this receives a great deal of attention.

On the map at various points, they see red tacks. After seeing these tacks, their eyes fall on a notice in an upper corner. It tells them that each tack marks the home of an owner of the car this man sells.

"And you would be surprised," the dealer said, "to notice how many glance at the map merely to locate their own homes on it. It is a good boost for us."

"If a certain space is in the path of thousands who might be our customers for used cars," figured the John T. Dye Co., of Los Angeles, "it is worth a great deal to have our sign there."

Accordingly, this concern bought an old building at one end of the North Broadway tunnel just to place its sign at that point. That sign is read by motorists at the rate of several a minute.

### SERVICING TRUCKS — SELLING TRACTORS.

(Concluded from page 16.)

trucks in storage and the white spaces showing vacancies. It is advisable to mark the dimensions of each truck stored on each colored pasteboard slip, as well as the truck's make and the owner's name. This gives a visible "history" of the trucks in storage, and is convenient in allotting new trucks

storage space of any particular size.

It is also a good idea to store the smaller trucks in the central spaces of the garage, parallel to the length of the building, with the larger sized trucks ranged along the wall and facing the center, this method permitting the larger trucks to move through clear aisles.

Jacob L. Freed & Sons, of Lansdale, Pa., find time to sell Case tractors, Case touring cars, Beeman garden tractors, agricultural implements of various kinds and gasoline and kerosene engines. They have a good tractor service for the farmers—there are about 75 nearby using tractors—within a radius of 15 miles, covering territory in both Bucks and Montgomery counties. Lester H. Freed is "inside man" and his brother, Warren H. Freed, does the soliciting of new

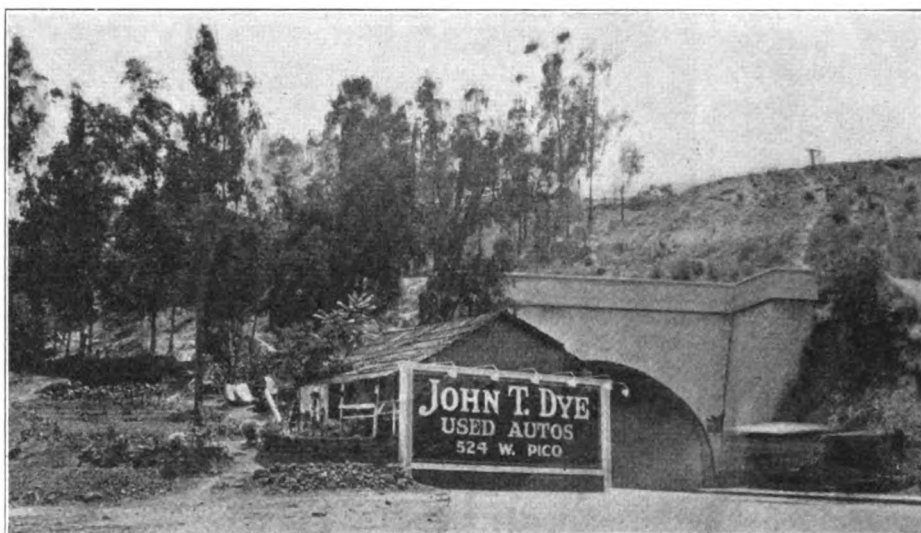
fare. Service is even extended in this small, but busy place, to teaching of each farmer how to get the best work out of his machine for the various types of work it will do.

Advertising folders from the factory are sent periodically to all customers and prospects by the Freed concern, as are catalogs and price lists of farming implements suitable to use with the line of tractors which it handles. Similar methods are used with regard to the small garden tractor.

The tractors are ordered by the carload, five to the load and are soon disposed of. Very little reserve stock is carried. The farms in the vicinity range from 60 to 220 acres each, but a good average is 100 acres. Some farmers having less than 50 acres as-

sert that they have used Freed's tractors and made them pay well. Not a few farmers in the neighborhood, proprietors of the larger farms, operate from two to three tractors each. In the Perkiomen district, especially, tractors are the rule.

The Freed's have a very businesslike way of keeping track of prospects, particularly for tractors.



A Motorist Can't Miss This Used Automobile Sign as He Goes Through the Tunnel.

business, going about for this purpose in the demonstrator touring car.

The tractor service includes the sending of a one and a half-ton Federal motor truck equipped with overhauling tools, jacks, towing ropes, chain hoist and parts, to the ailing tractor, where it is usually "doctored" as it stands. If necessary, it is hoisted to the truck and taken to the shop for thorough overhauling. Rapidity of service is a big card with this firm and the farmers evidently appreciate it, for its business is growing rapidly.

The firm maintains one of those well known and effective country "outdoor showrooms," wherein models of the stocks handled are entirely displayed in front of the place. They "hit you in the eye," as one farmer appreciatively says, and are in plain view of a much-traveled thorough-

On a white card, of the usual index cabinet type, nine by four inches, all useful data are entered. There is an entry on the card—"Circulars of following machines were sent"—which is used, of course, in connection with a follow-up system of folders and pamphlets, this entry checking up on just what has been sent out in this way. Thus a "repeat" is avoided.

Farm superintendents are often worth cultivating, as well as farm owners, as the Freed's have learned, and tabs are kept on them, too. The "remarks" entry is for recording any peculiarities of the prospect and serves to indicate the best way to approach him for a sale.

A "tractor ledger" is used by some garagemen and dealers selling tractors, but the Freed's find the card index system more modern and easier to handle



# Bee a Booster fer Your Own Garaje

When a Feller Boosts His Competiters Its Like Sittin on a Tree Lim and Sawin It Off Between Him and the Tree—The Feller Falls Down—Them Folks Give Me a Pane—I'm for Boostin My Own Garaje Every Time

By Frank Farrington

Deer Pete:

I herd it dont pay the railrode to run tranes to Pinkvill enny more so theyer going to stop. Why dont you cum over to a town that's on the map? Why your town ain't even in the blue book. Mebby sum day weel need a new feller on our force and Ile get the boss to giv you a job. If he wood, youd be in a place where theres sumthing doing. It woodent be enny such sinch as that drug store job youv got now. You dont hav time in a garaje to stand in the window and watch the stiles in chickins.

I lernd sumthing today, Pete, and mebby you woodent haf to lern it. Theres a few fellers that always get their gas and oil and things at a garaje just below us and then they stop heer and get free air becaws we have the best air

hose with a gage and everything on it. We dont get their munny. I always thought they had their nerv to do that and today one of em cum along and heed just got his tank filled at Murfys garaje and he kickt becaws the air pressher in our hose was kind of low and sed, "Why dont you start up your air pump, kid?"

"Whats the matter?" I sed. "Dont Murphy throw in air with gas enny more?"

Then he sed, "O, this is one of them tite wad garajes is it, where they hang out a sine 'Free Air' and then expect you to buy sumthing to get it." He got in his car and rode off. The boss cum out then and he rode too but he diddent ride off, he rode on me and he rode me hard too, Pete.

I cood see he was mad, but he kind of held up till he got his mad so he cood part way handel it ennyhow. Then he sed, "William, if we want to get more customers weev got to get em from the fokes that paternize other

garajes havvent we?" I sed we had got to and I sed we cood do it too.

"Well," he sed, "the only way we can do it is by making thozе custom-ers like us and our garaje better than they like the other ones, and the best way to do it is not to rub it into them that they aint our customers and make em sore at us like you did that feller that was after free air."

"But he never buys ennything off us and heez a regguler Murfys cus-

tomers had got all denatured and it looks like a indoors racing car and he haddent had it a week when one of the tires went kerflewie and Persy put on a new one. I was looking the old mechanical crickit over and I saw it had a tire on it like Murfy sells and we dont and I wondered how it cum that he had one of those tires on.

So I askt the boys out in the shop and they sed, "Diddent you know about that? Why, Persy says our tires aint enny good and that Murfys Domino treds are the best bet."

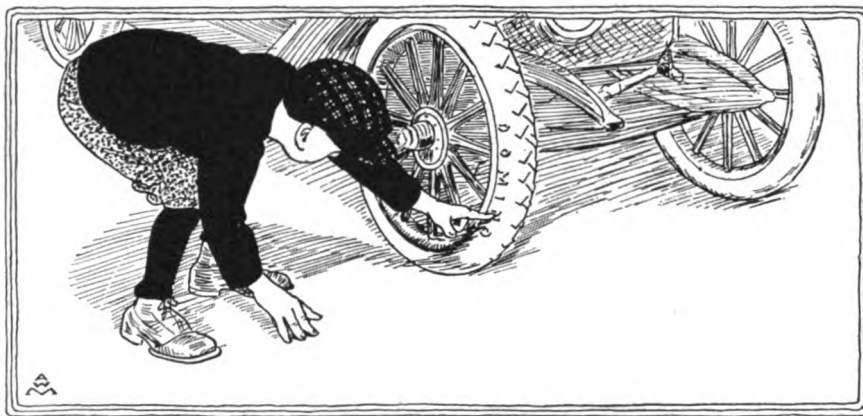
Now what dyou think of that? That guy goes buying his tire in our competi-ters garaje. The rummie! I told Bob about it and he sed, "Lets see if thats the only Domino heez got," and we looked inside the cover around his spare and it was a Domino too.

I feel like saying something but I kno the postmaster in Pinkvill mite think there was sum such langwidge in this letter and open it and Ide get pinch.

Bob sed, "Aint that the limmit? A fellow like him buying tires of Murfy when weer selling better tires heer and when heez just helping Murfy to do more bizness."

I cured him, Pete. I sed to Bob to let me fix him and I did. I made a sine and it red, "Employeeez of this garaje are requestid not to paternize our competiters," only I had Spike make a fancy copy of it. Then I put it up under the hook where Persy hangs his coat. I diddent let him see me and noboddy sed nothing to him. I diddent even dast to watch him when he saw that sine. But Ile say Persy aint boosting Murfys tires enny more and heez gone and turned the one on the car around so the name dont show.

Why, its like Bob sed, "The old fool. Heer heez working in this garaje and if this garaje doessent do



I wuz lookin' the mechanical crickit over and seen it had a tire on it like Murfy sells.

tomer and heez got an awful nerv to buy his gas there and then ask us to furnish the air free all the time." I sed that.

And the boss he cum rite back. "Yes," he sed, "and if we treet him rite heer and give him servis aint he more likely to buy heer sum day than if we tell him heez Murfys customer and heed better go there for what he wants?" He sed, "Dont never get mad at a feller becaws he likes to buy in sum other garaje. That aint the way to get him. Hees got a rite to buy where he wants to. But treet him so good heel think this garaje is way ahead of Murfys and more ackomoda-tin than enny of em."

Well I guess the boss is rite at that Pete, but it makes me sore when a feller keeps rite on buying from Murfys. His place is just a cheap kind of dump ennyway. Why cant they see how much better our place is?

Persys gone and got him a kind of a ex-flivver. Its a flivver sumboddy

a lot of bizness heel probly get fired the first one, and then he goze to work and helps us to do less bizness, and whats Murfy or ennyboddy else going to think when they see him riding Murfy tires around. Gosh, it makes me want to do what the lady in shaik-speers or sumboddys play sed, hand him a slam in the map."

He say so. Ide like to hand him the first one. I think if a fellers got enny interest in the place where he works heez going to be plugging for that place all the while and telling other fokes what a good place it is to buy

things and what good tires they have and how the oil is the best you can get and all things like that. He ought to be trying to get all the bizness there he can becaws aint it to his advantage to hav the bizness get bigger? Why that Persy woodent kno enny more than to sit on a tree lim and saw it off between him and the tree and down heed go, and thats what its doing when a feller goze and helps his competeters. Aint it so, Pete?

Why sum fellers in a garaje dont even kno what kind of stuff that garaje sells haf the time. Persy diddent hav

that excuse though becaws he does kno all about our stock. But havvent you bin in a garaje when sumboddy cum in and askt the man for sumthing theyd seen advertised by the boss and the man diddent even kno they had it? Say, sum fellers give me a pane, Pete. They dont know as much as a paper bag. I buleve in a feller getting wise to everything his garaje sells and boosting it all the time. Ime that way.

Hows sqwills and opiedildock these days? Is the profitteering pretty good in drugs?

Yours for bizness, BILL.

# When Customers Leave with a Smile

Are Your Customers Always Satisfied with the Treatment They Receive at Your Shop?—The Owner of a Busy Garage in Pennsylvania Finds an "Are You Satisfied?" Sign Effective in Sending Them Along with a Smile

By Harry Botsford

What is the general state of mind of the transient or the regular, or the might-be-regular customer, as he drives his car from the garage after a repair job? Does he believe that he has had fair treatment, honest 60-minute hours of mechanical work on his car, and is he satisfied that certain materials named on his bill have actually been put on his car? In other words, is he leaving the garage with a grin or with a scowl?

This is the question that troubled the owner of a small but busy garage in one of the thriving little towns in Pennsylvania.

He knew the difference between the two states of mind; satisfaction and dissatisfaction meant business or loss of business for his garage. Favorable opinion of the buying public—at which quality, sales letters, and advertising is directed—meant something to this thinking owner.

At last, he came to a decision. The decision has been carried out. After a year's experience, the garageman is confident the majority of people leave his garage entirely satisfied that they have been given a square deal.

As the motorist starts his car toward the exit, his attention is directed at a large sign, hanging from the ceiling.

The sign is red-lettered on a field of white and illuminated, night and day, with electric lights. It shrieks at

the motorist, who may be thinking that the garage has "slipped something over" on him:

*"Stop! Are you satisfied with the service rendered and with our charges?"*

*"If not, speak to the owner at his desk. He will greatly appreciate it."*

Not much to the sign, is there? Yet the manager tells me that he has often seen a car owner start to drive away with a worried and rather dissatisfied look on his face, and then glance up and read the sign. A transformation takes place. The man begins to think of the nature of the repair, the time it must have taken and the parts necessary for a good job. And he decides, then and there, that he really has been given a square deal. He goes away satisfied. And it is certain that he will come back again.

The customer who reads, heeds and investigates the sign, is likewise convinced. The manager's office is a railed-in affair, right on the floor of the garage. The idea, he admits, he copied from the offices of bank presidents. Years ago the idea in banking circles was that the president or the cashier of the bank should spend his time in a closed and nearly sound-proof office where it was exceedingly difficult to secure an audience with him.

Present-day methods of doing business have done away with this fool-

ish idea. Now, the average bank cashier or president sits all day long in an office where he can see every customer as he comes in the bank and pass the time of day with him, and where the customer can talk to him without running gauntlet of clerks and office boys.

This garage manager decided that too many garage owners had offices just like the old-time banker—so he had the railing made. Consequently, it is mighty easy for the disturbed and dissatisfied customer to see the manager. The customer is greeted cheerfully and his complaint—or rather symptom of complaint—is listened to attentively.

At the conclusion of this recital, the manager explains to the customer the system of double-checking every charge on a customer's bill. He explains how this double check is made on the material used against a stock-room report. In the end, the car owner is bound to be convinced that the mechanic who worked on his car gave 60 minutes of honest work to each hour and that the various parts and material were used to complete the repair. And he leaves smiling.

This system has built up good will; it has made friends for the garage—and it has made money for the garage! It's a scheme that costs so little and brings such large returns that it is well worth the attention of any garage owner.

# Speaking of Busy Service Stations—

There Is a Thriving One in Blooming Prairie, Minn.—Built in an Attractive Japanesy Style and Employing Efficient Sales Methods, It Has Gained the Confidence of Its Customers Who Boost It to the Final Letter

By R. A. Franklin

Where three state roads come together, at Blooming Prairie, Minn., is situated an odd little service station built in Japanese style. It is operated under the name of "The Prairie Oil Co."

Many a reminiscent smile flits over the faces of station patrons as they spy on their left—cheek-by-jowl with the 1920 way—an old-fashioned drinking fountain where in other days, faithful Dobbins stopped to slack their thirst. Now, only an occasional demand is made on it, while the 1920 service station waxes busier and busier.

Built less than a year ago at a cost of about \$15,000, it is, today, doing a thriving business selling the usual stock of gasoline, oils and tires, and also kerosene.

By selling only the best grades to be had in its line, by courtesy and friendliness, the service station gains the confidence and liking of its patrons, who just naturally become boosters for the firm.

The company advertises only locally, and the accompanying advertise-

As Mr. Wiger puts it, "We start with a full hose, and have in plain sight on each tank unit a gage easily read, so every customer knows he's getting in full measure what he calls for.

condition, as even when operated as this is, by electricity, a very tiny leak may mean disaster. Just a few sparks, or a spurt of flame, such as is caused by a short circuit, will ignite gasoline



Japanese Style of Architecture Is Used. At Right Are Gasolene and Kerosene Storage Tanks

"We handle two grades of gasoline and the best grade of kerosene to be had. It's quite a little more expensive being shipped from a long distance, but customers are so satisfied with it that it pays better in the long run. It's a hobby of mine to sell only the best."

The pressure for the filling units is obtained by placing the huge 12,000-gallon tanks on a concrete base, nine feet high, back to the station building, and then piping the kerosene and gasoline to the units.

By this method, much labor is saved, since it's just as easy to fill the units as to empty them into the tanks of the patrons, both operations being accomplished by this pressure.

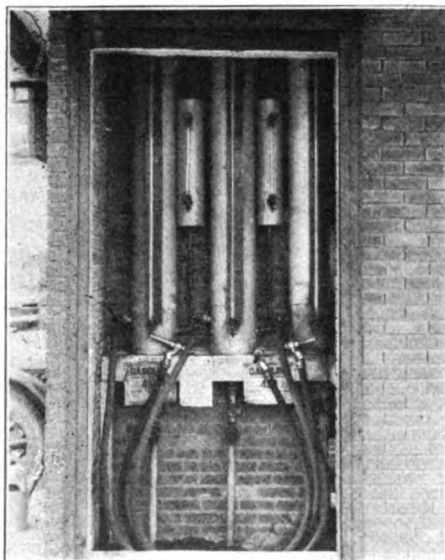
In the little metal building just in front of the tanks as seen in one of the illustrations, is the barrel filling unit from which are filled the tanks of farmers and others who buy in barrel lots.

Rotary pumps are used in pumping the gasoline and kerosene from the tank cars on the tracks to the pressure storage tanks. One pump, painted red, takes care of the gasoline; the other, painted green, handles the kerosene.

Great care has been exercised in installing the best machinery for this purpose, and keeping it in first-class

fumes as instantly in such a place as does the electric spark in the automobile cylinders, and oh—the result!

Another safety precaution is the placing of heavy steel doors in front of each set of filling units.



The Filling Units. At Top Is Safety Door. ment will give some idea of the rather striking, original style used.

Instead of the usual pumps for filling cars, the company has installed "filling units" operated by pressure.



**Any housewife can tell you that she can get a little more jelly by "squeezing the bag"—but she doesn't do it.**

It's the clear, natural drip of the pure fruit juice that gives her the prize jelly. When the natural drip stops and the bag is squeezed it crowds over a lot of pulpy particles that don't belong in real jelly. She wouldn't think of setting out such a grainy cloudy product if the minister came to dinner.

This a perfect illustration of the difference between true gasoline and the squashed out near-gasoline that big interests unblushingly hand out to you in all the out-glass pump of a real jelly dish.

True gasoline—or "straight run"—is the natural drip of the good, clean, explosive motor fuel that you need to get years ago. It is almost ready-made by nature, and separates as easily and naturally from the parent crude oil as steam rises from water. It is not marred by foreign particles of carbon or kerosene.

Keep the homely idea of the jelly bag in mind when you drive by temptation and

**LINE-UP WITH THE THRIFTY**



**Prairie Oil Co.**

"EMPHATICALLY INDEPENDENT"

TRUE GASOLINE PURITAN PURE PENNSYLVANIA MOTOR OILS  
Phone 34. Blooming Prairie, Minn.

Snappy Advertising That Brought Results.

# The Profitable Use of Taps and Dies

Tap and Die Equipment Has a Value to Repairmen That Cannot Be Overestimated—It Offers Opportunity for Satisfactory Work and Big Savings—The Results from Repairing Damaged Capscrews and Bolts Alone Is Surprising

By J. N. Bagley

Dick Hill is the owner of a large, well-planned garage and salesroom. He spends most of his time with the salesmen and does not give much of time or attention to the repair department, other than to see that the cars go to the customers in good shape after leaving the service department; in fact, it is his hobby to talk service all the while to the customer during the time he is making the sale. He not only talks, but he lives up to it to the letter after the sale is made.

Dick Hill is known the country over as a man of his word and his customers will swear by him, so to speak. Just for comparison, I might mention two instances that happened only a few days apart. I happened to be in Hill's salesroom when he closed the deal with a customer on a new \$2,800 job and the customer paid cash.

He said to Dick: "Now you are to give me free service for a year, is that right?"

"You bet your life," replied Dick, and with that the customer drove the new car out and left Dick singing, "Just a little bit added to what you got makes just a little bit more," as he placed the check in the safe.

The other instance took place two days later at about two blocks from Dick's place when the customer purchased a job worth \$875. The customer remarked, when he had finally decided to make the purchase, "You will give me free service for three months, you say?"

"Oh, yes," replied the dealer, "I always do that."

"Very well," returned the customer, as he started for the office of the salesroom, "just step into the office and put it on paper."

It's just the difference in men and their methods of doing business, that's all. Dick

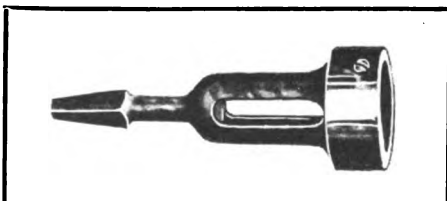


Fig. 1—The Bit, Brace and Die Stock for Special Jobs.

is making money and the other fellow is making a living.

But, as I was going to say, I had dropped into Dick's place for a purpose. I wanted to look over his shop equipment. I had a friend who wanted to equip a shop and, knowing that Dick's service de-

partment was a success, I wanted to look it over in order to give my friend a few good pointers. I told Dick what my mission was and he said, "You bet your life, just make yourself at home," and with that, he went to meet a customer, who had just driven in at the door.

Going into the shop, I found three workmen busy and after explaining my errand to them, went about the place unmolested. There were, in the way of equipment, lathes, drill press, grinder, welding machine and presses, besides numerous hand tools. I was just about to go out when, in coming by the corner farthest from the door, my attention was attracted to a box about the size of a gunshell box, filled completely with capscrews, and bolts of all sorts, sizes and lengths. I also noticed that all of them had been used at some time or other and upon examining them closely, found that the threads on the most of them were good, except the lead thread which was damaged until the nut could not be started; consequently, it had been thrown aside and a new one used.

Just at this moment, Dick came along and we had some little talk about the box of bolts and capscrews and I made a wager with him that I could come nearer guessing the number of bolts in the box and their original cost than he could. Dick, being a good sport, accepted the challenge, so we dumped the box over and counted and sorted the capscrews, which took about an hour's time. The box contained 2,853 bolts and capscrews and machine screws, and after figuring up the first cost, we found it amounted to \$199.71. Dick won the wager by \$12.

While we were sorting and filing the contents of the box, I placed in a pile by themselves, every piece that I considered worthless—there were 11 in all.

"Now, Dick," said I, "I want to tell you something."

"All right," returned Dick, "let us go out to the office where we can smoke."

"What I want to say, Dick, is this: You have in that box some good money that should be to your credit in the bank."

"How is that?" asked Dick, as he passed a fresh cigar.

"Well, you will agree with me that there is nothing wrong with those bolts and capscrews, except the nuts could not be started and the boys threw them to one side and used new ones when making the repair. About how long have you been collecting that box?"

"Four or five months, I should judge."

"Now, say five months, and that they

are worth \$199.71, first cost. That means that the boys have been putting into that box almost \$40 per month when it could have just as well been put into the bank."

"How do you figure that?" inquired Dick, becoming interested as he took off his hat and placed it on the desk.

"It is easily figured. There are just 11

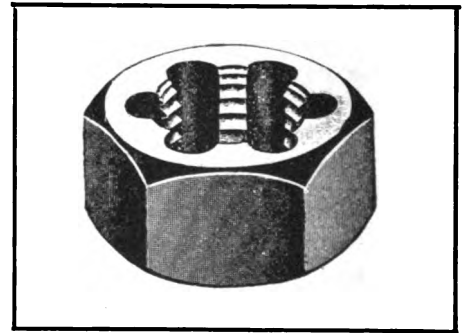


Fig. 2—The Solid Hexagon Die Used for Dressing Damaged Threads.

pieces that were either worn or broken, the balance of them have damaged threads. Why don't you instruct the boys to run the die over the threads and use the capscrews again, instead of using new ones?"

"They should do that, if it can be done. We will go back to the shop this minute and look into that very thing."

On taking the matter up with the foreman, we found that there were no tools in the shop for re-threading the bolts and capscrews.

The fact of the whole matter was that Dick was not a mechanic and had never given the matter a thought. The men, of course, would rather use new ones than fix the threads on the old ones. Therefore, they had not mentioned taps and dies. You can depend upon it that Dick Hill has a complete set of taps and dies in his shop today and that the bolts in the box have been re-threaded and placed in bins where they can be readily found when needed.

On one other occasion the writer counted 18 perfectly good shackle bolts, thrown into a corner in another workshop, that could have been used instead of new ones if the thread had been straightened up so that the nut could have been started. But there was no die in the place to do the little trick which would have taken, at the longest, about one minute. Eighteen shackle bolts worth from 20 to 75 cents each! Someone pays for this unnecessary waste!

Only a few days ago, while time was plenty, the writer visited 14 garages in a city of 10,000 inhabitants to get a thread straightened up on a Ford front spindle,



which was damaged purposely for the occasion. Two garages out of the 14 could do the work, and one said he always used a saw file for the purpose. Imagine a man in this day and age trying to cut a thread with a saw file when a complete set of taps and dies can be had at a nominal cost! In the language of Hiney, "Vy is ze resin?"

The value of the tap and die equipment in overhauling can hardly be over-estimated, for it can be used in so many ways in making a job more satisfactory to both dealer and user. Bolts become misplaced in re-assembling—that is, a bolt  $\frac{3}{8}$ -inch in diameter having a thread extending  $\frac{3}{8}$ -inch from the end, is used where a  $\frac{3}{8}$ -inch bolt should be used having the thread extending  $\frac{1}{2}$ -inch from the end.

In this case, when the nut is placed, it will only go as far as the thread is cut; consequently it will be necessary to look up a bolt having sufficient threads to allow of the nut going home, or the thread can be extended by running the die down on the bolt having the  $\frac{3}{8}$  inch of threads. The latter is the preferable plan, as it saves time for the service man and money for the customer.

Many times in starting a capscREW in a close place, the thread becomes damaged, in which case a new one will be necessary or the thread straightened up on the old one. In the course of a year, hundreds of such cases take place and if a new capscREW or bolt is used each time, it is expensive to someone, either the serviceman or the car owner, when it is not necessary that either be obliged to stand the unnecessary expense.

Stud bolts, as they are called, many times give no end of trouble in becoming damaged during the process of overhauling. A condition of the lead thread may be overlooked until the parts are nearly assembled and the nuts are to be started. If some suitable device is not at hand, it will be necessary to take down such parts as will make it possible to place a new stud bolt, or a die must be used.

In nearly every instance in places where stud bolts are used, the ordinary die stock cannot be used after the parts have been assembled. Some special device must be used. Many times the bit and brace and die stock as shown in Fig. 1 will answer very nicely, but, on the other hand, for the want of space even this cannot be used. For example, in replacing the cylinder block on the case, it is an easy matter to damage the thread until the nut cannot be started and still the stud bolt is in good condition itself other than the lead thread.

This happens so often that a die manufacturer came to the rescue with a solid hexagon die as shown in Fig. 2. These dies are used, however, only for repair work for dressing over-bruised threads or threads that have become gummed or rusted until the nut cannot be started.

The one great advantage which this die has is that it can be worked in the same space as the nut so that the nut can be

placed without taking off any of the parts that have been assembled, as they take up no more room than does the nut itself. An ordinary wrench may be used and, in case this will not work, any of the socket wrench family can be substituted to place the die over the thread.

This little tool is invaluable in the garage or repair shop, but in all my investigations I have found only two sets of them—one contained four sizes, the other six sizes. As a labor and time-saver, this tool has no equal, and it is inexpensive, for a complete set of them can be had for a very small cash outlay. They can be arranged in a suitable case and used in the garage or taken to the field in the service car.

Buying taps and dies by the set will be found to be a logical plan, for in so doing a suitable container will be had for storing them when not in use and protecting them from dust and dirt. In addition to this, the sets are made up by the manufacturers to comprise the sizes most used. If possible, it is a very good plan to buy one large assorted set having all the sizes to be used.

Of course, many times this cannot be done because of the large number of different sizes needed, in which case it will be necessary to divide the assortment the best way for convenience. For example, a combination set including the following sizes, U. S. Standard and the S. A. E. standard, work very nicely together, as a set of this make-up covers the field very nicely for the average repair shop:  $\frac{1}{4}$ -inch,  $\frac{5}{16}$ -inch,  $\frac{3}{8}$ -inch,  $\frac{7}{16}$ -inch,  $\frac{1}{2}$ -inch,  $\frac{9}{16}$ -inch,  $\frac{5}{8}$ -inch,  $\frac{3}{4}$ -inch,  $\frac{7}{8}$ -inch and 1-inch are the sizes most used.

The cost can be reduced by buying dies

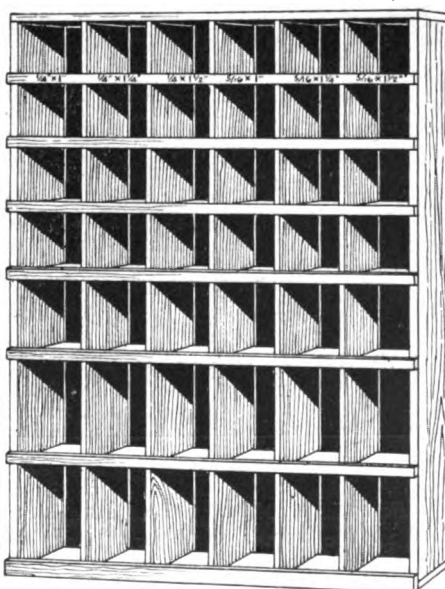


Fig. 3—Three Wall Cases Provide a Method for Savings in Screws.

interchangeable with one or two die stocks. However, it is very convenient to have a full mounted set, as it saves considerable time in exchanging dies. It is a question whether or not, time considered, full-mounted screw plate sets are the cheapest in the

long run. Of course, to some, the difference in cost may be more of an object than the time it takes to change the cutting dies and use one or two die stocks.

The cutting die is an accurate and somewhat delicate tool and the judgment must be exercised in using it. In the first place, one should use precaution that the die is not used on case-hardened stock or the die may be ruined. Neither should it be used on a rod or bolt that is badly rusted, for the cutting edges may be damaged until the thread will have a ragged edge instead of a smooth surface.

One of the important things to remember in using a die of any manufacture, is the lubrication. Usually the manufacturer recommends some particular oil for thread-cutting and it should always be used according to the formula. However, lard oil will be found to be very satisfactory, as it prevents the overheating of the die and is responsible entirely for ease of operation, especially when the larger sizes are used. All oil and cuttings should be removed from the die as soon as the oil has served its purpose for, if oil and cuttings are left, dust collects and quite materially impairs the cutting.

Jim Gordon, who operates a well-kept garage and machine shop, has a method which will, no doubt, be of value to many others in the same line of business. Jim has three wall cases as shown in Fig. 3, each having 42 pockets about 12 inches deep and somewhat larger at the bottom than at the top.

Under each of the bins or pockets in the same position on each case is stated the size and length of the capscREW it contains, as shown at the top of Fig. 3. One case contains the new capscREWS, while each of the other cases is used for the old ones, designated respectively, "Damaged" and "Rebuilt." Here is his plan; it is a good one to try out:

When he has overhauled a car and starts to reassemble it and finds a capscREW that will not receive the nut, he places it in the pocket of the case marked "Damaged." He then looks into the pocket in the same position on the case No. 2, which is marked "Rebuilt." In case he finds one there he uses it; if not, he passes to the new case to obtain a suitable screw.

This method works out very nicely until a slack time comes in the shop, when he puts someone to straightening up the threads on the capscREWS in the case marked "Damaged," transferring them to the case marked "Rebuilt" when they are ready for use in the next job of overhauling.

Jim was pleased to go into detail about his plan, for he thinks it a good one. In handling the overhauling in this manner, the customer gets his work out of the shop in the least possible time, as no time is lost trying to start stubborn nuts; neither is there any time lost by getting the wrong length of screws.

In case the wrong screw has been used some place about the car and the one that is left will not work in the place in which it should be, all that is necessary for him to do is to step to the case marked "Rebuilt" and select a cap screw for the place. The difference in value for the place of a new and of a rebuilt screw is not worth mentioning.

This is Jim's plan for handling the cap-screw situation during the process of overhauling and while it may not appeal to some, it may advance an idea that will enable one to work out something which will be entirely satisfactory along this line. I might add, however, that at this time, Jim has in his shop eight sets of taps and dies ranging from the smallest machine screw sizes to a number of sizes for threading pipe and tubing.

He takes much pride in keeping his tools in the best condition; in fact, he showed me one set of dies that had been in use 18 months and the interior of the case was not oil-stained and the dies were as bright and new-looking as if they had just come from the factory.

"Does it pay to have so many tap and die sets?" I asked him.

"Does it pay?" I should say it does," he answered. "They pay in my shop better than almost any other tool."

I then noticed that he used dies of a number of different manufacturers and asked him his preference.

"Well," he replied, as he scratched his head, "I don't know as I have any particular preference. Every one of the sets that I have is entirely satisfactory. While I realize that there are some sets which have a decided advantage over others, I have never read a great deal about them. I just selected the sizes and the jobber sent me what he happened to have in stock. That is the way I came to have this 'Duke's Mixture' of things that you see here."

If all the repairmen in the country would take up Jim's plan of saving the damaged cap screws and bolts, the saving would, in the course of a year, be surprising.

### Automobiles and Trucks Waste Gasolene Heavily.

An investigation was recently conducted by the American Chemical Society for the purpose of determining the amount and composition of the exhaust gas from motor cars and trucks and providing some means

of protecting human beings and animals from the deadly carbon monoxide which is given off by the burning of gasolene.

"Surprising and, from the point of view of conservation, disquieting results were obtained," says Dr. Fieldner, supervising chemist of the experiment station of the United States Bureau of Mines at Pittsburgh. "The average automobile owner and truck operator is wasting from 20 to 30 per cent of his gasolene by using too rich a mixture. Preliminary tests on 70 representative cars and trucks show an average of from 6 to 8 per cent of carbon monoxide and 7 to 9 per cent carbon dioxide in the exhaust gas.

### "Only a Grease Spot" But It Is a Business Success.

One feature of the oil station that makes A. M. Service's place in Baker, Ore., stand out apart from the others, and renowned for its popularity, is its name.

Having a suitable surname himself, Mr. Service decided to get out of the beaten path so far as a name for his station was concerned. He called it, "The Grease Spot." Now it's about the best known oil station in that part of the country.

### Handling Cars in Storage by the Railroad Roundhouse Method.

An automatic car storage device that will make no longer necessary the morning waits at garages by owners of cars buried deep in the mass of stored automobiles has been invented by P. B. Cole,

manipulate it so that the platform will deliver the car opposite any "stall" in the storage room, whether it be on the first or second story.

Cars may be stored as closely as anyone desires, and it is made impossible for one car to jam another. This method, it is asserted, will save from 15 to 20 per cent of floor space. When storing cars, it is not necessary for the operator to leave his place of operation, as the dial before him indicates not only where his carrier is but what stalls are occupied or empty. Any car in storage can be moved when desired without making it necessary to move another one.

The inventor's powers were said to have been stimulated by his experience in driving a car from Nebraska to California and back home again. He estimated that he lost about three hours a day getting in and out of garages, where no intelligent effort had been made to handle a vital part of the work of storage.

Mr. Cole says that in a large garage the invention will save several men, and that in all garages it will give what every owner certainly desires, the impression of proper service to all customers.

### Automobile Transportation Field Developing in California.

A marked feature of the work of the California Railroad Commission during the year was that resultant from the development of the state's youngest utility—transportation by motor truck and stage. Given impetus during the war by the demand for

added transportation facilities, the automobile, both freight and passenger carrying, developed rapidly as a common carrier. California's road system lent itself to this development. Today the state is served by a veritable network of automobile lines and the demand for operating permits is ever increasing. There are about 900 legally established operative rights on file.

Development of this utility is being carefully guided.

"Today the automobile transportation field is receiving the most careful attention. Haphazard operation is not possible; permits are issued only on a showing that public convenience and necessity require additional transportation facilities in the district sought to be served. A high standard of service by automobile carriers that insures for the traveling and shipping public maximum of safety and comfort, has been established by the commission."



What's In a Name? This Garageman Decided It Was Just About "The Whole Thing."

of Cambridge, Nebr. In addition, it is said to save from 15 to 20 per cent of floor space. It is an adaptation of the railroad roundhouse method of handling locomotives.

Upon entering the garage, the automobile is driven on a turntable platform, which is equipped with grooved tracks. The operations of the turntable are controlled by electric power and one man at the wheel in the first story office can

# Welding, Cutting and Brazing Practice

Owing to Nature of Metal and Shape of Certain Automobile Parts It Is Often Better to Use Brazing Instead of the Welding Process in Making Repairs—The Usefulness of Brazing Is Illustrated in This Crankcase Job

By David Baxter

There are some classes of automobile repairing done with the oxy-acetylene torch where it is better to braze the parts instead of welding. In fact, there are some jobs where welding is not at all sat-



Fig. 1—Heating the Old Casting to Assist in Removing It.

isfactory, while a brazed joint will hold indefinitely and is more easily made.

A great many times this is due to the shape of the thing to be repaired and to the location of the fracture or other defect. As a rule, however, brazing is employed mostly on account of the nature of the metal in the parts to be repaired. If the section is thin or complex, the brazing process is used because it is simpler and does not require the job to be dismantled. If the metal in the job is of such nature that it will not fuse easily, brazing is resorted to.

Of course, the torch operator should take into consideration the fact that brazing is merely adhesion and, therefore, not so strong as welding. Hence, it should not always be used in preference to welding, just because it is more convenient.

Consideration of the strain likely to be put upon the brazed parts must be regarded. Of course, this consideration is nullified to a great extent by the kind of metal being required. For instance, if it is malleable cast, or some form of special steel, the operator may be forced to use brazing in order to make a bond that will hold.

As an illustration of the usefulness of brazing, let us take a specific example and see just how the work is done. Since nearly all brazing is the same as regards the actual melting and applying of the bronze, the torch operator can soon learn the other classes of this work. In this case, a job has been selected that is more or less familiar to all automobile repairers—the crankcase, or oil pan, of a Ford car; a Ford pan, as it is popularly known.

Being constructed of steel, pressed, and having the different parts riveted together,

this device is usually repaired by brazing. The riveted joints work loose and cause leaks in different sections of the pan. While these may not for a time impair the strength of the pan, they should be brazed as soon as the leakage is noticeable, to prevent a waste of oil.

Besides brazing to prevent leakage and to add strength to the riveted joints, there is another repair that is handily made with the torch. This consists of removing a worn ball socket, and replacing it with a new one. And it is this repair that we will discuss in particular.

The socket is a casting attached to the lower side of the pan for the purpose of holding the ball on the apex of the "wish bone" or V of the radius rods. These sockets often wear out quite rapidly and should be replaced with new ones, both the part attached to the pan and its mate—a simple procedure with the torch.

First, the pan is placed upon the welding table or on the floor in about the position shown in Fig. 1. Then a fairly large size torch is lighted and its flame regulated to neutral. This flame is played in a large circle around the old casting to burn off all grease and dirt and thus pre-

vent it from interfering with the brazing.

The flame is then adjusted so that it carries an excess of acetylene and is applied to the casting. This is what is termed a reducing flame because the temperature is not so high and there is not so much danger of burning the metal. The excess acetylene flame may be held closer to the metal without so much danger of oxidizing it. Of course, the standard neutral flame can be used all right, but the reducing flame is, no doubt, safer for the novice on jobs like this.

The flame is played back and forth and around on the socket casting until it becomes red hot all over. In fact, the casting is made bright red around the edges where it joins the pan, the intention being to get the bronze, which attaches the casting to the pan, near the melting point. It is then very brittle and the socket may be easily knocked off with a hammer and chisel as is shown in Fig. 2.

Just as soon as the casting is bright red, the torch is shut off and placed to one side. Then the operator seizes a hammer and chisel and removes the worn socket by placing the chisel against its side, striking the chisel smartly with the hammer. A few sharp blows usually start the socket and then the blade of the chisel is inserted beneath it; a few more blows and the casting flies from its bed. Of course, the operator should be careful not to hit someone with the hot casting, or that it does not start a fire in some hidden corner of the shop.

If the socket does not break off readily, it should be heated again, as it probably was not hot enough. The bronze by which it is held must be hot enough to be brittle before the socket will break away from its moorings. When brass or bronze is heated too near the melting point, it is very weak and will crumble under a light blow. It will pull apart in a brazed joint under the least strain. The brazing does not always pull away clean from the brazed part, but the remaining bronze will do no harm.

The reason, then, for heating the socket and its brazing metal is to cause the joint to be weakened so it is easily separated.

Before the old casting has been removed from the pan, however, the welder should cut the rivets on the inner side of the pan. This is easily accomplished by inverting the pan upon an anvil or other solid surface and shearing the rivet heads with a sharp, thin-bladed chisel. If the chisel is correctly held, the rivet head will be easily



Fig. 2—Knocking the Old Socket Off With a Hammer and Chisel.

cut. After shearing the rivets, the pan is placed in the position indicated in Fig. 1.

When the socket casting has been knocked off the pan, the force of the brazing flame is used to blow away the loose bits of dirt or bronze that may have lodged in the old joint. A blow or two with the hammer will jar loose any stubborn bits.

The position of the pan is now changed to that shown in Fig. 3, which also shows the brazing of the new casting. In this position the new socket will remain in place without clamping or other fastening; also nearly all of the joint will be in a horizontal position and, therefore, easier to braze because there is little tendency to run or flow on the part of the new brazing metal when it is melted.

First, the new socket is accurately fitted in the exact place of the old one. This is ascertained by the rivet holes. The holes in the new socket should exactly fit the holes in the pan; also the socket should fit snugly to the pan. Any roughness that may be present on the socket or the pan, should be removed before setting the socket.

Then, after tilting the pan about, as shown in Fig. 3, the welding flame is applied to the socket. The same reducing flame is used in this part of the process, or a strictly neutral flame may be employed. In the reducing flame only, a very slight excess of acetylene is used. First, the flame is regulated neutral, then the acetylene is increased by a slight turn of the valve.

This flame is played all over the new socket until it is red hot, then the flame is concentrated along the edge of the socket where it joins the pan. Here it is moved back and forth until the metal starts to melt. At this point the filler rod is introduced. The rod is melted on top of the melting pan metal; or rather in the corner of the socket and pan. A large drop of the filler is melted and pushed back and forth along the corner.

The force of the flame is used to shape and level the new metal, but the operator should not apply the flame too ardently or too long. The application of the filler should be rapid and deft, forming a fillet along the edge of the socket. As fast as the filler is worked out smooth, another drop is added to the next portion of the edge. The flame works a little in advance all the time to pave the way for the new filler.

In preparing the edge of the socket for the filler, the welder should be careful to not melt too deep. Barely the surface of the pan is melted; just a thin skin of the pan and casting surface is melted. In fact, the metals are not exactly melted; they are merely brought to the melting point when the filler is added.

The welder does not attempt to fuse the joint, but merely to cause the bronze to adhere to the steel. The bare surface is brought to the white hot stage. The filler

metal is piled upon this melting portion and rounded over the edge of the casting. This filler is fully melted, but the under metal is not.

The filler metal used on jobs like this Ford pan is of good grade of cast brass rod or some sort of bronze like Tobin. The rod is about a quarter-inch in diameter. It is applied with a sort of twisting movement, which deposits a drop of filler



Fig. 3.—Tilted Position of Pan When Brazing the New Socket.

and still keeps the rod in contact with the molten bath. The filler is not allowed to drip into the bath, but is literally pushed into it, to minimize oxidization as much as possible.

Since the melting is much easier than that of iron or steel, a larger rod may be used than in welding. This is due, of course, to the fact that it merely adheres to the surface of the brazed parts. It is easier to get a larger portion of the surface ready for the filler so that a larger quantity of the filler may be added at one time.

The brazing flame should be held farther away from the metal than a welding flame and allowed to soak into the metal. It is not good to try to force the work by holding the flame too close or too long in one position. The welder should keep a wary eye on the flame and its work so he can advance or retard the flame as it is needed. A slight revolving movement is also advantageous because it tends to prevent over-melting or burning the bronze.

A larger torch and, therefore, a larger flame is employed on a job like this than would be used if it were welded, due to the fact that larger quantities of filler metal are handled. The bronze melts so easily

and is so readily guided about with the flame pressure, that the welder can fill a great deal more space than he could with iron or steel. Therefore, he can employ a larger rod and larger flame.

A good flux is used during the entire brazing process. It is applied with the filler rod by dipping the heated end of the rod in a pot of the flux and quickly depositing a quantity upon the surface of the molten metal. This is done at frequent intervals and liberal amounts are applied each time.

The flux melts and spreads over the surface of the braze to protect it from oxidization by the atmosphere and by the flame. The oxygen of either one attacks the melted bronze the moment almost that it is molten, to turn the surface to oxide if it is not protected. This oxide prevents the metals flowing and mixing properly.

The manipulation of the flame and filler rod is probably the main thing in executing a successful brazing job. After the operator learns this part of the work, he will find that brazing is the easiest repair he can make.

There are several ways of holding the filler and directing the flame to produce fair results, and it is difficult to say which is the best since one will suit the individual ability of one operator better than another. However, in the job illustrated, the operator held the filler rod at about right angles to the flame, and held the flame so that it played across the molten metal, not directly down into it.

This lessened the danger of burning the metals and also afforded an opportunity to watch all parts of the work at the same time. As the brazing progressed, he walked around the pan, or, in other words, changed his position in order to keep the flame and filler rod in the same relative positions.

Drop after drop, the bronze filler was added entirely around the socket. Each bit was melted and smoothed flat and evenly with the flame pressure, sloping gradually up over the edge of the new socket and spreading out thinly over the surface of the pan. The last drop was mixed with the starting point by re-melting it and flowing the two together to make a leak-proof joint.

After the brazing was all finished, the pan was allowed to remain untouched for, perhaps, ten minutes, after which it was ready for service again; providing, of course, that none of the bronze had invaded the stud bolt holes.

This is another advantage of the brazing process; the job need not be covered, or slow-cooled as is the case with most welding jobs, to prevent contraction cracks. It may be moved almost as soon as it is finished, or as soon as it cools below the crumbling stage, as soon as it loses its red heat.

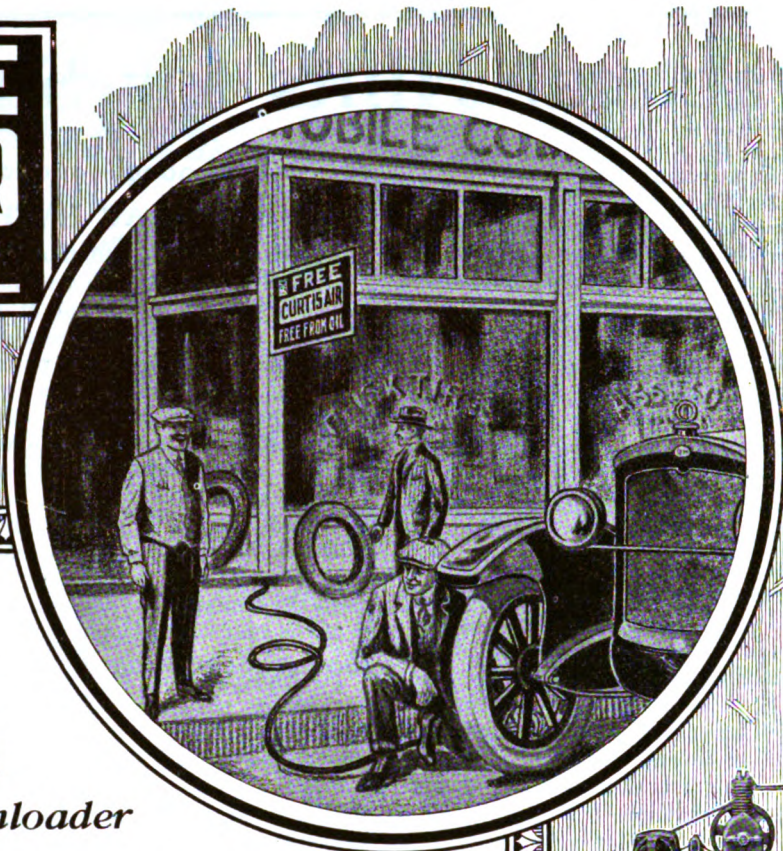
This pan, however, was inverted as soon as cool enough to touch up the rivet holes on the inner side. These holes were filled

(Concluded on page 38.)





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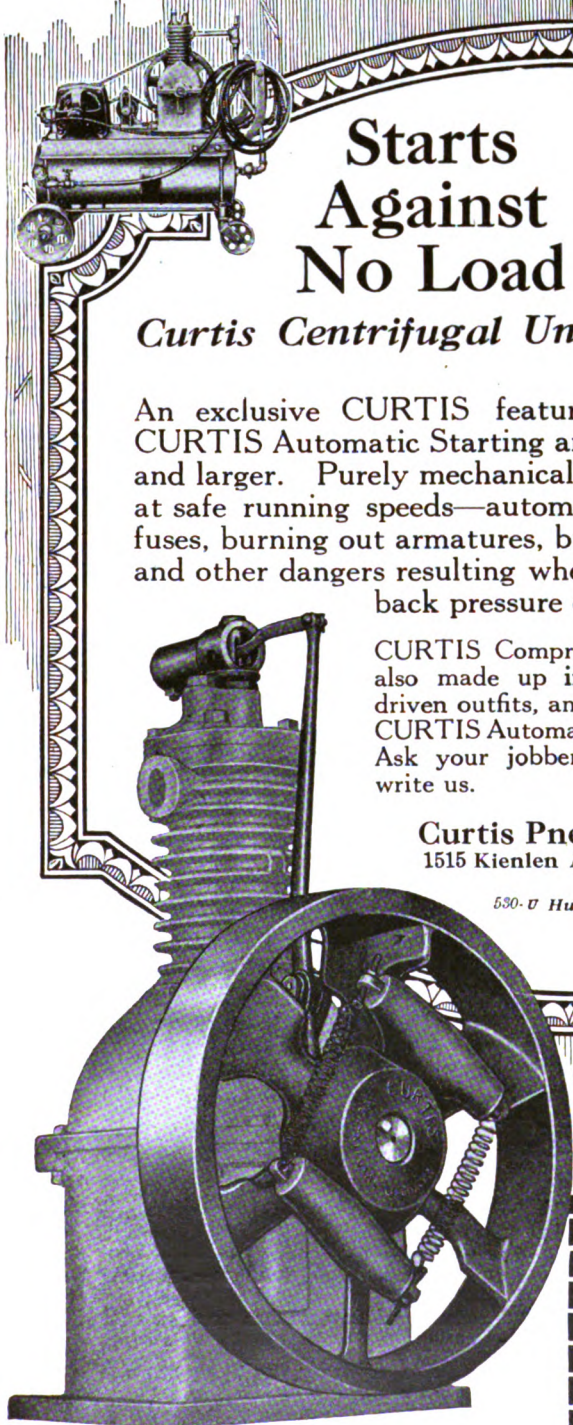
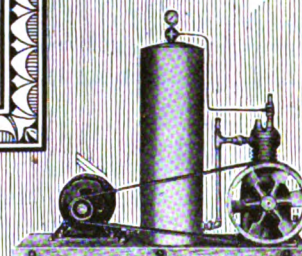
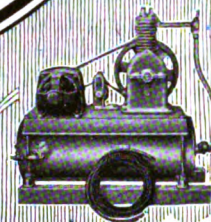
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# Practical Hints for Shop Mechanics

## Connecting-Rod Scoop.

A connecting-rod scoop may be made from heavy sheet metal. It is placed directly under the oil hole, where a slot is cut in the shape of a triangle in the sheet metal about three-quarters of an inch long and bent down.

The length may vary according to the closeness with which the rods approach the pan.

If the motor has a very long stroke and more splash is wanted, the slot may be cut in the shape of a rectangle so that it will splash more oil.—K. F., Mo.

\* \* \*

## Worn Guide Will Cause Miss.

Air leaks are a common cause of misfiring though they are often overlooked. A worn valve guide allows enough air to be sucked into the cylinders to cause misfiring and it also permits oil to leak out.

If oil is discovered leaking out, it is fair to assume that excess air is being injected into the fuel charges.—F. B., La.

\* \* \*

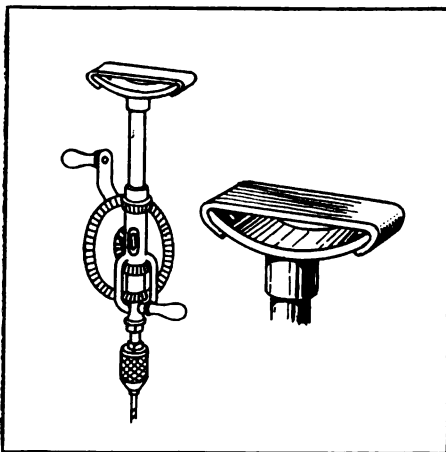
## Breast Drill Pad.

Those who have occasion to use a breast drill very often will appreciate the simple idea shown in the accompanying sketch. A piece of old belting, which has become softened, is attached across the breast plate as indicated. This makes a soft saddle for one's chest when pushing against the drill.—C. W. N. H.

\* \* \*

## Using Stationary Power.

In garages where car work is done, it frequently occurs that the car is "pulled" by another car to start it. Most garages have an engine or electric motor for com-



A Breast Drill Pad Will Be Appreciated.

pressed air service. Run a belt from small pulley of the power or countershaft direct on a tire of the rear wheel raised off the floor. While in motion, put the engine clutch in slowly on high gear. This runs

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the engine. Carbureter or other adjustments can be made on the floor. All this can be done by one man. No extra car or help is needed.

While a car is being pulled or towed, it is difficult to make carbureter adjustments. By using stationary power, the operator can make all necessary adjustments and is close to any of his tools which might be needed.—T. M., N. M.

\* \* \*

## Valve Grinding Stunt.

When ready to grind valves which are set in cages, I find the easiest method is to place the pneumatic or electric grinder in the vise and remove the bit from the shank and slip a piece of 1/4-inch pipe over the shank. A piece about two inches long is right.

Drill two holes through the section of pipe and secure it to the shank with a cotter pin. Then insert the end of the valve stem in the end of the pipe and fasten with another cotter pin. Hold the cage in the hands and start the grinder to operating. This is an easy, speedy method.—R. W., Mo.

\* \* \*

## Clutch Trouble.

If the sliding member of the clutch is rusty, it will give the effect of a grabbing member. The routed portion will prevent the clutch's engaging, gradually holding for a fraction of a second, and thus forcing a quick engagement. Repairmen often believe that the trouble is due to poor facing or worn engaging member.—L. A., Cal.

\* \* \*

## Checking Pump Leaks.

When the stem of the water pump has become so worn, usually in an angular groove, that the pump cannot be packed to make it tight, remove the spindle, true it up on the lathe, and have a new bushing

fitted to it. After this is done, the joint can be made tight if hemp soaked in tallow, wicking, or some other good packing is used.—N. A., Pa.

\* \* \*

## Leak in Valves.

In reading your August issue I found an item relating to slow leak in valves causing deflation of tires.

It made me think of the fact that the rubber cushion seat on the valve inside gets hard from age and pressure and in reflatting it will not seat properly, causing the valve to leak.

I have known tourists to be delayed by not having an extra valve, when a drop of oil on the valve would soften the rubber and allow it to seat, stopping the leak.—L. B., Pa.

\* \* \*

## Belt Enclosing Suggestion.

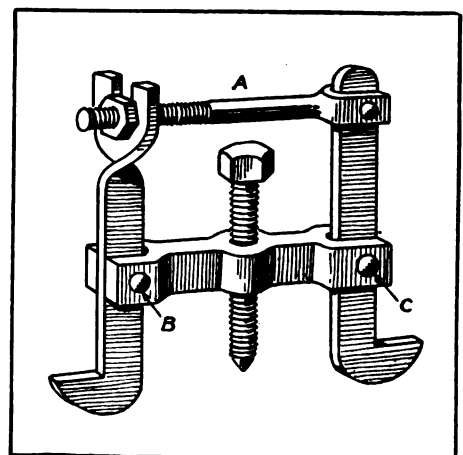
For the shop owner with "safety first" in mind, the following is a very good means of enclosing the belt on a lathe or any other such machine, so as to leave it accessible.

Construct an iron-pipe frame of 3/8-inch pipe and cover it with wire cloth. This frame is so arranged that the side where the operator stands can be swung open, the hinge being made of an ordinary T-joint with the threads bored out in a lathe or drill press.—G. L. S.

\* \* \*

## Wheel Puller.

Every now and then some mechanic invents a new device for home use. While there are an almost endless number of different wheel pullers, the one shown in the accompanying sketch is a simple home-

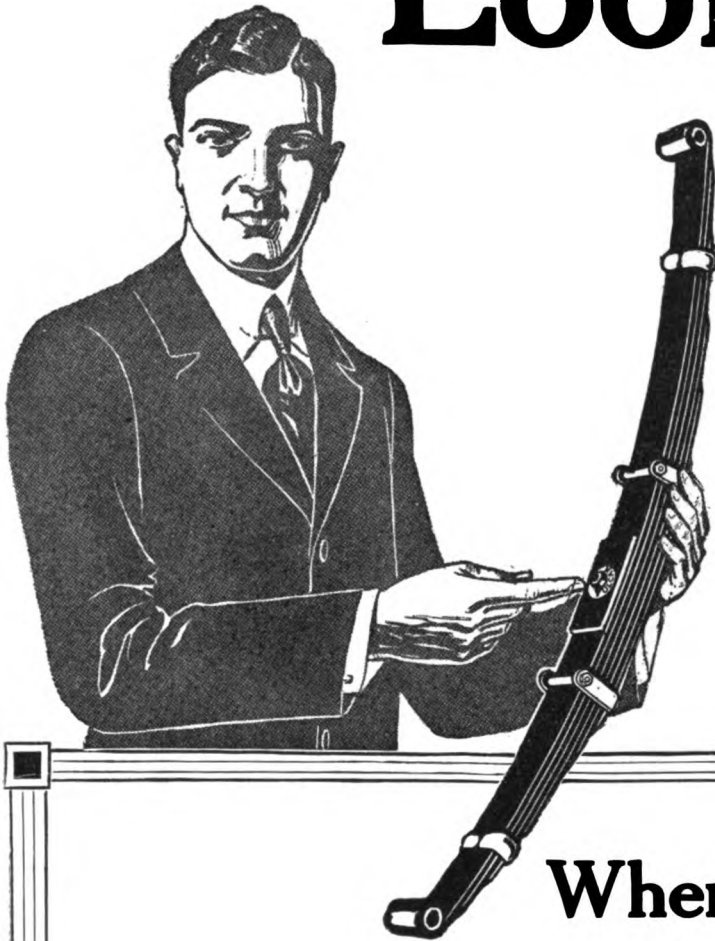


Wheel Puller With Non-Slipping Feet.

made affair that has positive non-slipping feet.

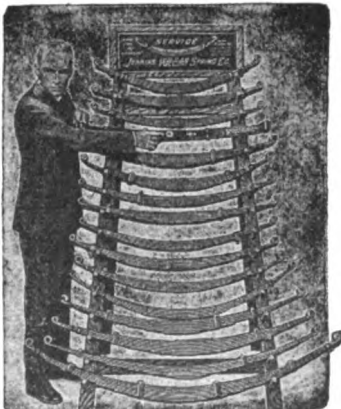
The adjusting bolt, A, keeps the legs spread and the feet can be turned outward as shown in the sketch, or can be turned

# Look for it!



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inward by taking out the two pins, *B, C*, and changing the position of the nut of bolt *A*, so that it is forced out against the leg instead of in as it is when the puller is used as shown in the sketch.

### Steering Knuckle Play.

Play in the steering knuckle due to a worn kingpin or knuckle yoke may be taken up by reboring the yoke and fitting bushings. Much front wheel wobbling is caused by looseness in this joint.—K. R., Mont.

### Extension Funnel.

An extension funnel is useful in getting at out-of-the-way places, and it may be made by soldering a long tin spout on the end of an ordinary funnel at an angle.

A screen, soldered or riveted in the body of the funnel, will catch any sediment.—A. B., Ohio.

### Repair for Cracked Nut.

When a nut cannot be replaced, due to its peculiar size or thread try the following method. Place nut in vise and file a recess on the inner surface so as to form a shoulder. Then secure a heavy washer and force over the part that has been filed down.

When turned in place, the washer cannot come off and it will hold a cracked nut from opening up. If desired, the crack can then be brazed.—R. W. T., Mo.

### Testing Air Pressure in Tires.

As it is very important to keep the proper amount of air in tires, most mechanics use a tire gage. But frequently the end of the valve needle is so far down in the stem that the gage will fail to register.

I have found that the plunger may be unscrewed a couple of turns with the valve cap and then, when the gage is applied, the pressure will usually be registered. Then screw the plunger back onto its seat.—R. T. J., Mo.

### Cleaning Weapons.

Wire brushes are fine weapons for use in cleaning the running gear of the car preparatory to overhauling and painting. Here is a better one than the hand brush.

Fasten a circular scratch brush of wire in an electric hand drill and just see how the dirt and grease melt away from the part attacked.—B. J., Wyo.

### Removing Chips.

In drilling perpendicularly in large work which must be frequently examined and where the drilling chips are hard to remove, the chips can be easily blown out by inserting a tube near the bottom of the hole and blowing through the tube with the breath or compressed air.

The tube should not be too large, but that the chips would pass by, nor too small to admit a sufficient amount or force of breath to raise the chips. One blow will

usually clear all chips from the hole.—T. M. S., N. M.

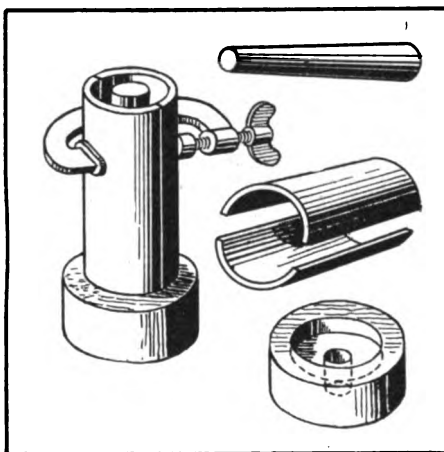
### Method of Starting Tap True.

Very often it is desirable to have a hole in a piece of work tapped at right angles to its face. This may be accomplished by using a guide nut. Select a nut that fits the tap to be used and has the same number of threads.

Face the nut in a lathe on a mandrel, making the face perfectly perpendicular to the thread. To use, start the nut on the tap; then press the face to the face of the work, and it will guide the tap straight into the hole.—R. W. T., Mo.

### Babbitt Bushing Mold.

Often it is necessary to make a new babbitt sleeve bushing for a pump shaft or



Handy Home-Made Babbitt Bushing Mold.

other part of machinery. I have made a mold for the purpose from a piece of pipe and a taper pin and bit of cast iron.

The details are shown in the sketches and the device is easy for anyone to make. The range of pipe sizes allows one to make these bushings for almost any shaft. The rough cast bushing is afterwards turned in the lathe to the desired size.—C. W., N. H.

### Testing Oil Levels.

In testing oil levels run a wire through the cock before assuming that the oil is low. Often sediment collects around the cocks in the crankcase so that the oil cannot flow out and it looks as though the lubricant was running low when in reality there is plenty.—L. A., Cal.

### Internal Short.

When one of the cells of the storage battery shows a loss of 50 to 75 points in the specific gravity of its electrolyte and no leak can be discovered, an internal short circuit is indicated and should be remedied at once.

Whenever the specific gravity of one cell falls more than 20 points below that of the other cells, there is trouble somewhere and it should be run down without delay.—K. M., Ore.

### Emergency Patch.

Ordinary tire tape may be used to patch inner tubes by running it twice around the tube and overlapping the ends so as to cover the leak. Surgeon's plaster may be used in the same way in an emergency.—D. P., Mich.

### Service Feature.

We cover the fenders and seats with a piece of canvas when we are working on a car. This service feature calls forth many favorable comments from visitors and owners of cars who come to the shop.—R. L., Mich.

### Cleaning Leather Upholstery.

Don't use gasoline to clean leather unless you want to crack it. Plain water with a few drops of ammonia will remove the dirt, after which the upholstery should be rubbed briskly with a soft cloth.

An excellent leather dressing is made by combining two parts of linseed oil to one of turpentine.—A. T., Cal.

### For Clear Windshield.

Here is a simple recipe I have used for keeping moisture from obscuring the windshield:

Rub the glass all over with strong soap-suds made from automobile soap and permit the suds to dry. This prevents the formation of the small globules that hinder clear vision through the glass in rain or mist.—W. T., Cal.

### Clutch Trouble.

A loose rear end bearing in many cars will permit oil to run back into the clutch housing so that it must be drained out every two or three weeks. The remedy is obvious and it will be well to examine the oil retainer between the clutch and transmission, as part of the trouble may come from this.—B. S., Pa.

### Cleaning Parts.

Parts removed from the car may be cleaned by washing in a hot solution of sal soda and then thoroughly drying. This was the method of cleaning employed with the field guns of our artillery during the late war.—J. M., N. C.

### Packing Gasolene Pump.

A satisfactory material for packing the stuffing box of the gasolene pump is hemp string and soap. Gasolene will dissolve practically any kind of oil used as a lubricant, but it has no effect on soap, so that this material may be used in place of grease as a lubricant, or in place of red lead in making screw joints tight.—N. L.

### Protecting the Wiring.

It is well to enclose the electric wires with rubber tubing at the points where they are held to the iron frame. The tubing may be slit to admit the wire and then be clamped to the frame.—L. A., Cal.

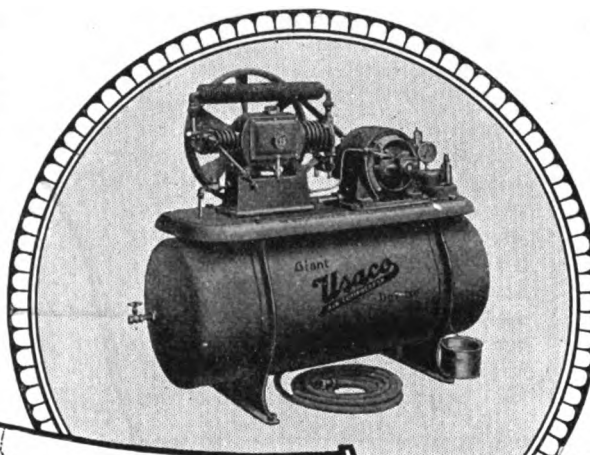


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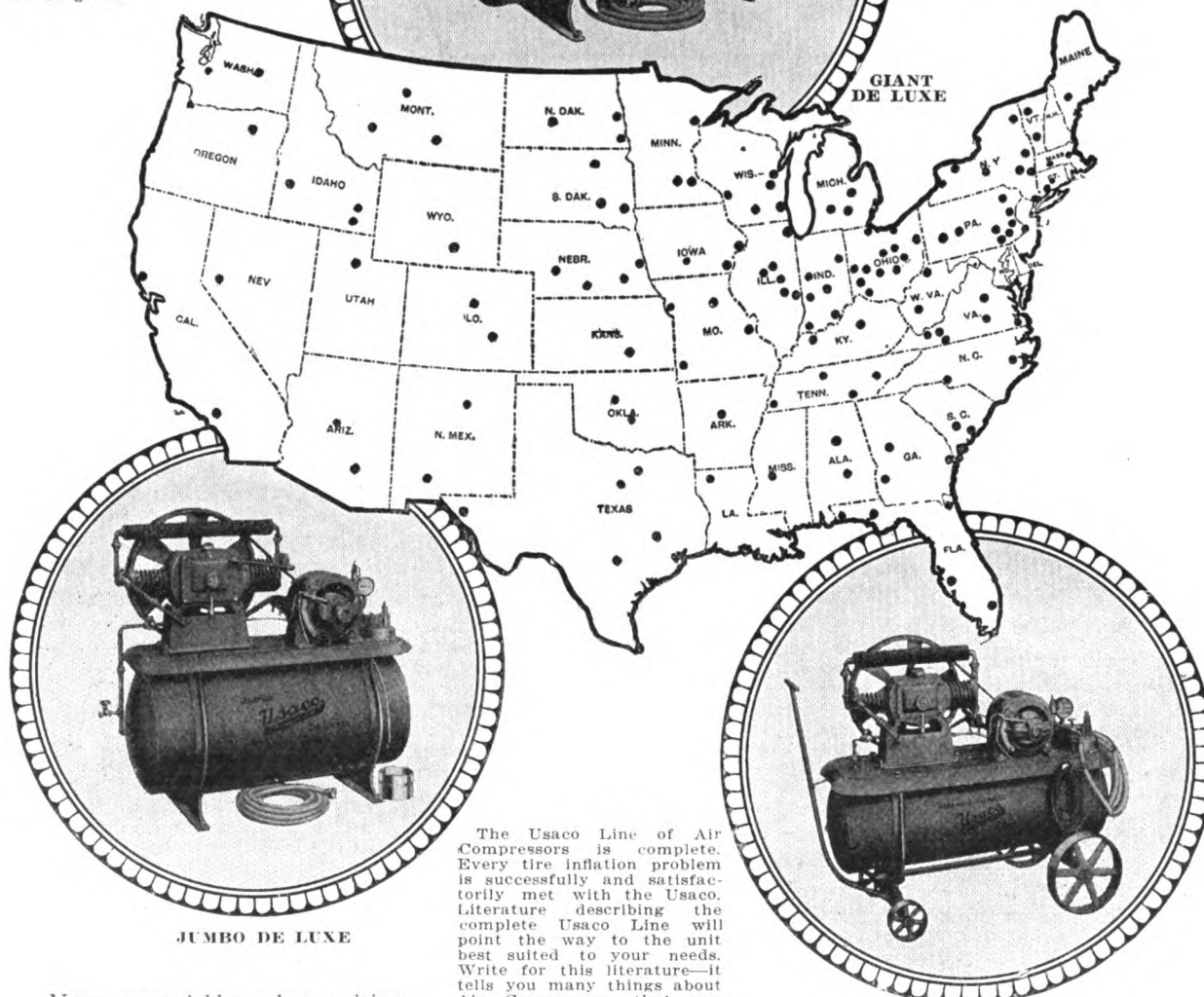
Usaco Air Compressors are carried in stock by jobbers throughout the United States. Any one of the 21 different types can be quickly purchased by the Garage Owner from his nearest jobber.

Just as the Garage Owner recognizes the Usaco Line as embodying high quality of material and workmanship, and incorporating features of proved worth,—so does the jobber see in the Usaco Line the qualities that enable him to recommend unhesitatingly, and with the assurance that a full measure of dependable satisfaction will be given.



Usaco Air Compressors are wholly automatic; self-contained; quiet running and capable of delivering High Pressure Air in great volume. Select the Usaco Equipment best suited to your particular needs and you will find that even the largest Giant Pneumatic Tires can be quickly inflated without strain or overheating.

It is the fact that Usaco Air Compressors are quality built, capable of rendering year in and year out service in the face of the most severe trials, that places them on the pinnacle of merit. No worth while feature is omitted—no undesirable feature is included—and there are many distinct Usaco advantages.



JUMBO DE LUXE

*Name your jobber when writing*

The Usaco Line of Air Compressors is complete. Every tire inflation problem is successfully and satisfactorily met with the Usaco. Literature describing the complete Usaco Line will point the way to the unit best suited to your needs. Write for this literature—it tells you many things about Air Compressors that you ought to know.

STANDARD DE LUXE  
One of Four Portables

**The United States Air Compressor Co., 5308 Harvard Ave., Cleveland**

# Readers' Questions and Answers

## Engine Will Not Pull.

A four-cylinder engine which was recently brought into my shop will not pull. When started, it backfires through the carburetor and if the clutch is thrown in, it stops. Can you tell what is the trouble?—G. S., Pa.

The trouble may be that the carburetor gives altogether too weak a mixture, due to faulty adjustment or to it or the fuel piping being clogged with dirt. It is possible also that the spark timing is not right, very likely much too late.

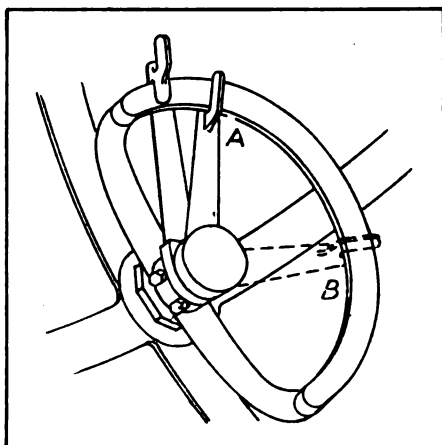
Try cleaning out the carburetor for a richer mixture. Also check up the timer setting and valve setting, in accordance with the directions given in the instruction book or obtainable from the factory which built the car.

\* \* \*

## Trouble with Spark Control.

A Dort car, 1920 model, was brought to me today which was in A-1 condition with the exception of the spark control. The motor starts all right and runs with the spark lever at position A, as shown in the sketch. It will run perfectly with the lever at any position except at B. When the lever reaches this position, the motor stops instantly just as though the ignition switch were turned off.

The primary wires do not come in con-



The Spark Control Does Not Work Properly.

tact with anything to short-circuit them at this point, and the breaker points work properly. Any advice on this will be appreciated.—B. G., Wis.

Every indication seems to point to a short-circuit or broken connection in or near the distributor of the car. You say the motor runs perfectly at any other position of the spark lever, so we assume that the cam in the breaker box has not slipped, causing the ignition to be changed.

We suggest that you test the wires leading to the breaker box to see that none is broken inside the insulation, drawing the ends apart at this position of the spark lever or distributor.

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

Make a careful examination of the bushing or bearing carrying the distributor to see that it is not worn, allowing too much play or wobble, causing the breaker to catch (or points too far apart) in the breaker box at this position of the spark lever, preventing its proper operation. Upon removing the cover of the breaker box for inspection, the breaker was perhaps freed, leading you to believe that it was working properly.

An inspection should also be made of all insulations where the wires come into the breaker box, also any other insulation between the breaker box and distributor. We believe that you will find the trouble in one of the several places mentioned.

\* \* \*

## Spinning Clutch.

What causes a fabric-lined, multiple-disk clutch to spin? There is also trouble in changing gears, especially in getting into low gear from neutral, when the engine is running. The owner complains that he has been compelled to put the low gear in, hold out the clutch and then start the engine. What is the cause and remedy for this difficulty?—R. K., Pa.

It may be that the facings of the disks have worn enough to have altered the position of the rest of the pedal to such an extent that it cannot be moved forward sufficiently to separate the disks so that disengagement is complete. If this is the case, a pedal readjustment will probably set matters right.

If the pedal in its engaged position is considerably farther forward than it used to be, this is most likely what the trouble is. Lack of lubrication of the clutch-shaft

bearing will also cause the driven clutch member to spin.

\* \* \*

## Cement Clogs Radiator.

Do you recommend putting anti-leak cement into a radiator? Since I put anti-leak cement into a radiator, the water circulation is nearly stopped up and the radiator gets hot. I have tried to clean it out with lye and with soda, but have not succeeded. Do you know of anything I can use more satisfactorily?—V. M., N. Y.

As we do not know the composition of the cement that you used, we are unable to tell you what to use to remove it. A radiator specialist can probably tell you what to do. These repairers have acid baths, means for applying pressure and other facilities for dealing with these cases.

\* \* \*

## Gasolene Tests.

Can you furnish tests of various gasolenes?—P. B., Ia.

We cannot furnish anything of value in this line. Gravity tests of gasolene, made with the hydrometer and expressed in Baume degrees are no longer of value, under present conditions involving blended fuel. Gasolene sold under the same brand, differs in quality in different parts of the country and at different times, so that tests that are quoted are of little general application, especially as the brand is seldom stated.

A form of test of value under existing conditions is the distillation test, which indicates what percentage of the fuel evaporates as its temperature is increased. The average gasolene sold over the country last winter is reported to have shown the following distillation properties:

Twenty per cent, evaporated at 200 degrees Fahrenheit; 50 per cent at 259 degrees; 90 per cent at 369 degrees and a temperature of 427 degrees was required to fully evaporate it. The average boiling point was 264 degrees Fahrenheit.

\* \* \*

## Front Wheel Brakes.

Why have front wheel brakes not been applied to American stock cars, as they are in Europe? There must be some important advantage in this construction, and I cannot see why American manufacturers do not take it up.—L. P., Ohio.

The real reason behind the apparent American indifference to front wheel brakes is the price. They cost too much and add complications, while fairly satisfactory results are obtained from our present brake types. Better brake action is claimed to be obtained from front wheel brakes, especially if the left front and right rear are operated together and the right front and left rear are interconnected.

# SCHRADER-UNIVERSAL



WE CORDIALLY INVITE YOU  
TO COME AND GET FURTHER ACQUAINTED  
WITH  
**SCHRADER UNIVERSAL PRODUCTS**

AT THE AUTO SHOWS

**N. Y. AUTO SHOW**  
JAN 8<sup>th</sup> TO 15<sup>th</sup>-1921 (SPACE #C-36)

**CHICAGO AUTO SHOW**  
JAN. 29<sup>th</sup> TO FEB. 5<sup>th</sup>-1921 (SPACE #25)

**A. SCHRADER'S SON, Inc.**

(FOUNDED N. Y., U. S. A. 1844)

**BROOKLYN, N.Y.**

CHICAGO

TORONTO

LONDON

### Wiring Diagram.

When you have an opportunity, will you kindly publish a wiring diagram of the Dort car?—P. L., Ore.

The wiring diagram for which you ask is to be found at the bottom of this page.

\* \* \*

### Battery Trouble.

We have a customer who has a 1918 Maxwell-25 that has battery trouble. He can't keep his batteries up. They will hold up about two weeks and go dead. His generator charges about 8 to 10 amperes at normal speed. The batteries go down while the car is in use and also while not in use. It seems as if they go down more when the car is not in use.

I have tested all wires and cannot find a short-circuit anywhere. He has a brand new Willard thread rubber battery that is in perfect condition and I know that the trouble does not lie in a fault of the battery. This car has been giving this trouble for about three months.

The generator charges all right.—T. H. P., Tex.

Assuming that your battery is in perfect condition, there seems to be no doubt that there is a ground somewhere in your wiring or in some of the units of the system. Connect one terminal of an ammeter to one side of the battery, first removing the wire from the battery. Connect the other terminal of the ammeter to the wire you have just removed from the battery. This will bring the ammeter in series in the electric system of the car and will register any loss of current by ground or otherwise.

By tracing the wiring carefully and removing the wires, one at a time, and replacing after each test, between the units

of the system, you will be able to tell just where the trouble is located. For instance, should the ground be located in the switch, when the wires are removed from the battery side of the switch, the indicator of the ammeter will fall to zero; when replaced it will again show the loss of current. When the wires are removed from the opposite side of the switch, it will continue to show the loss of current, indicating that there is a ground in the switch. If you will proceed with this test throughout the system, you should have no trouble in finding the faulty unit.

\* \* \*

### Queries on the Engine.

What is the firing arrangement of six-cylinder engines? 2. Can you tell me the reason increased compression pressure increases the efficiency of an engine? 3. What is Robert's formula for calculating gas engine horsepower? I will be very grateful for this information.—B. L., Ohio.

Each cylinder of a four-cycle engine is arranged to fire once in each two revolutions of the crankshaft. With six cylinders acting on the same crankshaft, in order that each cylinder should fire once during each such period and that the power strokes should be equally spaced, a cylinder should fire each one-sixth of the cycle of 720 degrees. One-sixth of 720 is 120, and thus the ignition is so timed that some one cylinder fires each 120 degrees of rotation. The order of firing is arranged so that the vibration may be minimized.

2. The smaller the space into which a given quantity of charge is compressed, the less cold cylinder-wall surface it will be in contact with, and the less loss of heat

will occur, when combustion takes place.

3. Horsepower equals the bore, in inches, squared, times the stroke in inches, times revolutions per minute, times the number of cylinders (four-cycle), when this product is divided by 18,000.

\* \* \*

### Defective Cell.

The battery in one of the cars in our shop refuses to start the motor, also the lights are not as bright as they should be. Two of the cells show a specific gravity of 1.275, the other shows practically nothing. What is the cause of this, and why does this cell take no charge? The generator seems to be working perfectly.—P. B., N. Y.

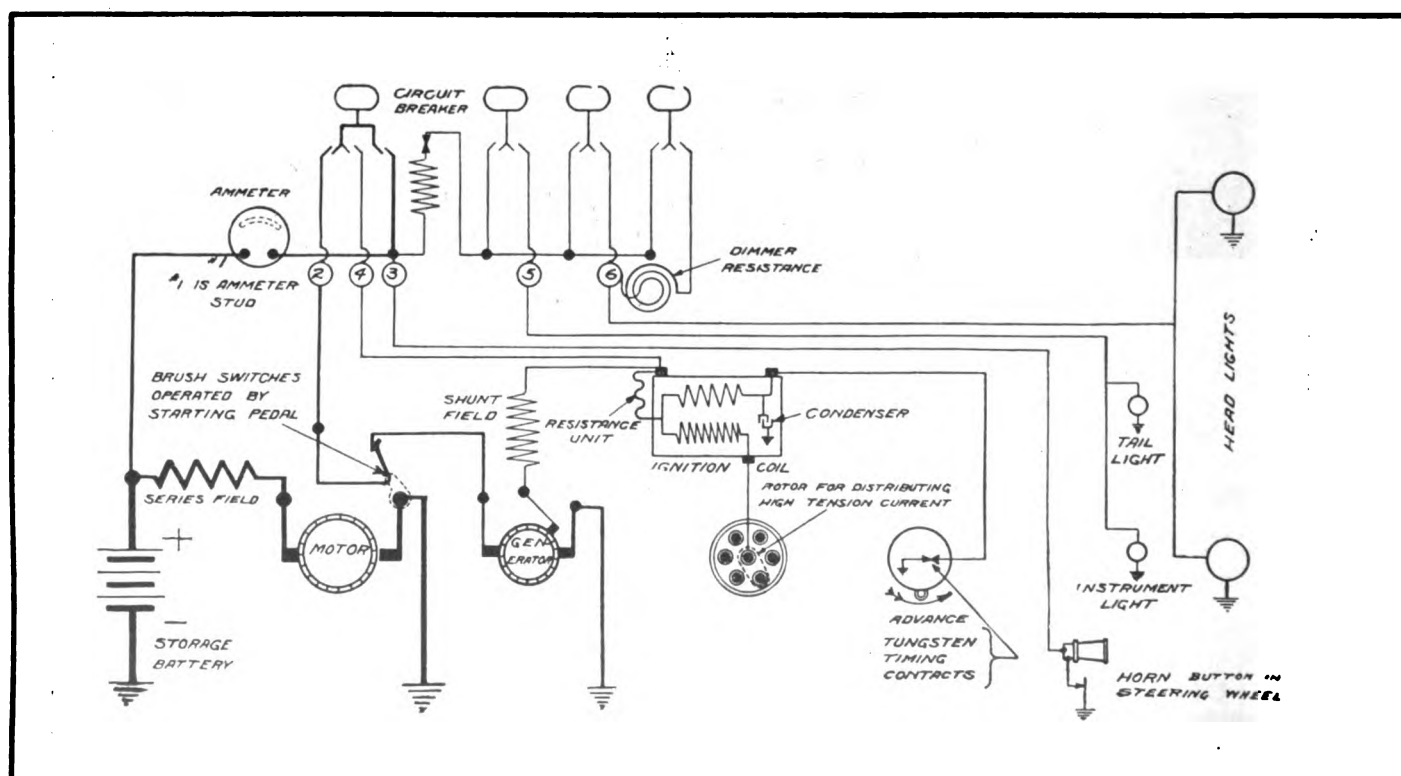
A battery is no stronger than its weakest cell. This accounts for its not starting the motor. Examine the separators between the plates in the weak cell. They, no doubt, have become perforated causing a short circuit, preventing the cell from taking a charge. Sediment may also have accumulated in the bottom of the battery jar, touching the bottom of the plates, causing a short circuit.

\* \* \*

### Storing Tires.

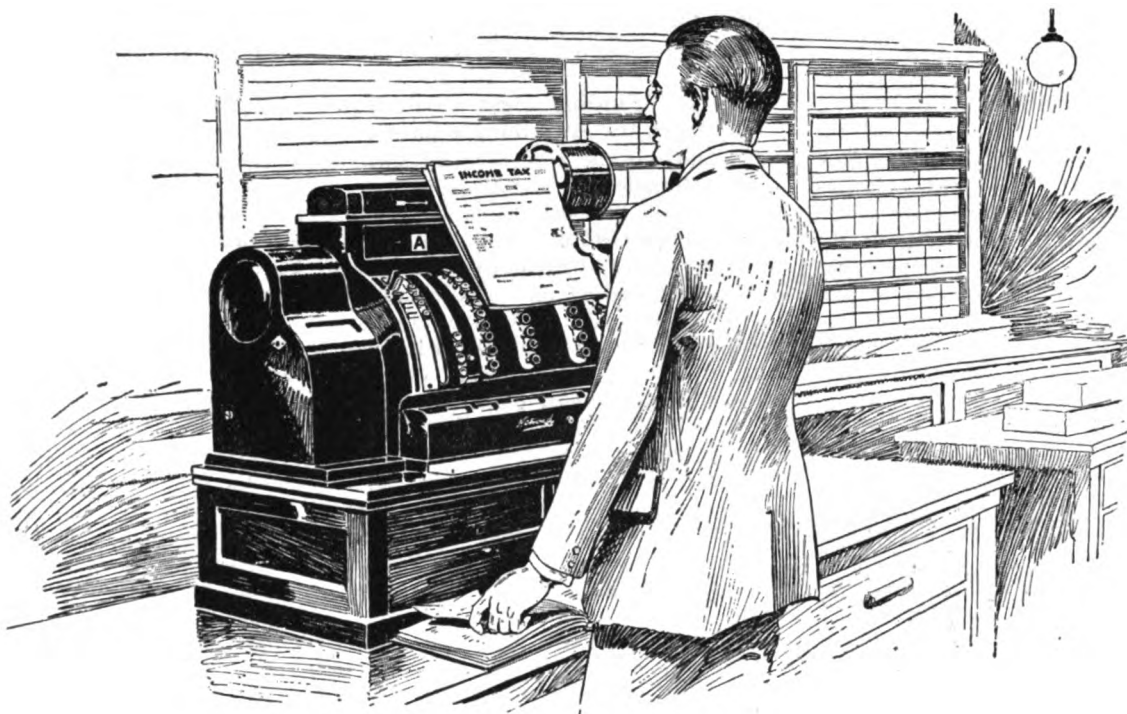
Can you tell me a good way to put the tires of a car away for the winter so that they will be in good shape next spring?—M. C., Ohio.

Wash the tires carefully on the outside to remove oil and grease. Remove tires from the wheels and wrap them up in paper or cloth. Store in a cool, dry place away from daylight. If tires are left on the car, jack up the car, deflate the tires and wrap them in covers. Don't let the car stand on tires all winter. To do so means a new set of tires next spring.



The Wiring Diagram of the Dort Car.





## Accurate records make it easy to make out an income tax report.

An up-to-date National Cash Register gives complete and accurate records of—

- |                 |                        |
|-----------------|------------------------|
| ① Cash sales.   | ③ Received on account. |
| ② Charge sales. | ④ Petty cash paid out. |

A merchant must have these records to make out his income tax report.

National Cash Register records are printed and added. They are always available and always reliable. There is no other way a merchant can get these records so easily as with a National Cash Register.

Every merchant needs these records once a year for his income tax report. He needs the same records every day to control his business.

**We make cash registers for every line of business. Priced \$75 and up.**

# NATIONAL

## CASH REGISTER CO.

DAYTON, OHIO.

## WELDING, CUTTING AND BRAZING PRACTICE.

(Concluded from page 28.)

with bronze to prevent any chance of leakage and to further strengthen the bond between the casting and the pan.

The filler metal was applied in much the same manner as the main job. The bare surface of the pan around each hole was made white hot and a drop of filler added to it. The flame was rotated over the drop of filler to flatten and soak it into the hole. Then the pan was set aside to wait the pleasure of its owner.

Fig. 4 shows a Ford pan that not only had a socket brazed on, but had several loose parts repaired by brazing. In each instance the work was done in practically

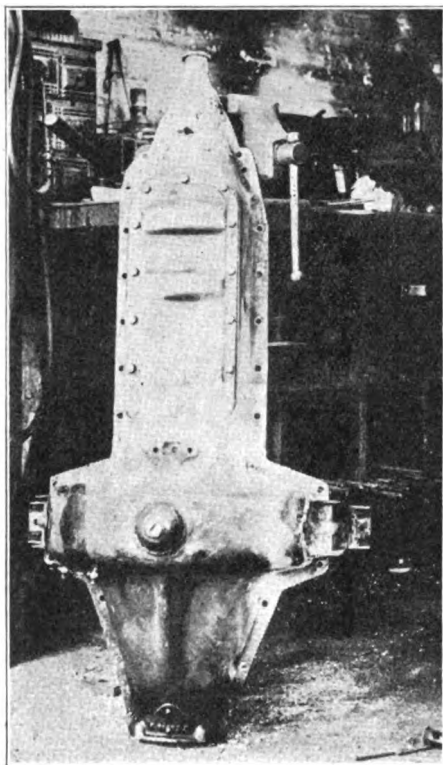


Fig. 4—Ford Pan, Showing Several Brazed Parts Repaired With the Welding Torch.

the same manner as the job of repairing the socket. The hanger brackets had worked loose and were brazed solid by melting a file of bronze entirely around them, joining the edge of the brackets to the pan; also the crank end was fastened rigid with bronze.

In both instances the surface of the pan metal was heated bright red and the bronze melted onto it. In none of the jobs was any attempt made to fuse the filler and pan metals into one mass. The filler was merely adhered firmly to the pan.

This makes a substantial leak-proof joint and may be applied to all loose parts of a Ford pan, in most cases without removing the rivets.

Such work may be welded with mild steel filler, but is not so simple a proceeding and it is attended with some danger of distortion. There is not much dan-

ger of cracking the piece but there is often some trouble in getting the steel filler to fuse properly with the pan metal, so after all it is not as strong as a brazed joint.

## Tests for Finding Best Road Surfaces for Automobile Tires.

To find out the type of road surface which will inflict the least amount of wear on automobile tires and thereby reduce the present \$1,000,000,000 annual tire bill, is to be the object of exhaustive tests which are contemplated by the Asphalt Association in co-ordination with other interests.

Eight million automobiles and trucks with their 32,000,000 tires need only call for an average annual outlay of \$125 to make the total cost for tires \$1,000,000,000. This is far in excess of the annual expenditure for construction and maintenance of highways and if a type of surface is designed to effect a reduction of only 10 per cent in the costs, it will release a sum which, capitalized at 5 per cent, will amount to \$2,000,000,000.

Tests will be under the auspices of a national board of disinterested engineers whose findings will be beyond any criticism of bias or prejudice. Coincident with the tire tests will be a series of tests to determine how best to resist the pounding impact of heavy truck wheels.

## Proper Lubrication Means Life and Health to the Motor of a Car.

Lubrication mistakes are the most costly mistakes a motor car owner can make. Improper lubrication will wreck the finest engine built; proper lubrication will safeguard it for years and insure sweet running. Proper lubrication will do more, it will keep your car out of the repair shop. It will reduce costs of operation. It will save you from road troubles.

A motor car engine is a delicate piece of mechanism. It operates at terrific heat and under severe strains.

In order to protect the parts of your engine from friction, it has to be kept well lubricated. Two metal parts, rubbing against each other at high speed, generate extreme heat. The greater the speed against the friction, the higher the heat. To prevent this friction, there is only a thin coating of oil which acts as a cushion between the metal parts. If that thin film of oil is not of good quality, it will not do its work.

In buying lubricants for motor car, truck, or tractor, do not let the price consideration govern your choice. It costs less to produce poor lubricants, but the price paid in lost service, in repair bills, in vexatious troubles is many times the difference between the cost of good motor oils and poor oils.

It is a general rule, worth remembering, that advertised and trade-marked products are safest to buy. The manufacturer who advertises his trade-marked products, knows that in order to live and prosper,

he must put good quality into his products. That is your protection when buying advertised and trade-marked motor oils, gear greases and gasoline.

Extracting the different products from crude oil—petroleum—is a process of scientific refining. Crude oil is a nasty smelling, viscous stuff. Its elements are so closely blended that the processes of separating them have been compared to separating the blended colors of the rainbow.

Scientific refining processes separate these various elements of crude oil and process them by a long and intricate series of operations until each is completely isolated with no trace of the other elements. This is called scientific refining. It entails countless costly tests, running into the millions in big refineries.

It is only in this way that it is possible to obtain pure oils which will withstand the friction and tremendous heat of operating an automobile engine at high speeds.

Don't neglect the lubrication of your motor cars. Keep them well supplied with lubricating oil at all times. See that this oil is pure, tested to stand the hard usage it will get in the engine, and renew it often so that no sediment may remain to carbonize valves and cylinders.

Good motor oils—trade-marked oils—will save from worry and expenses of upkeep.

## "Seein' Things at Night"—"Auto Mirage" Discovery of Science.

The next time you think you see two cars coming along the highway, and discover later that there is only one, don't call up a brain specialist or sign the moonshine pledge. It's just another of those "auto mirages" and you aren't to blame.

The "auto mirage" was discovered by two Reed College professors who were motoring from Reed College in Portland, Ore., to the University of California.

"While passing over the Pacific highway in the Sacramento Valley just after dusk," they write in the Science Magazine, "a car with powerful lights came over the rise a mile or so ahead. A minute later, the lights of a second car appeared some distance in front of the first, as if the driver had just turned them on.

"These lights were about half as brilliant as those of the first car and the impression was that two cars were approaching—a small one followed by a larger one. The large car was seen to gradually overtake the small one until finally the two sets of lights coalesced and a minute later we met and passed—a single car."

The article in Science explains that the Pacific highway in the Sacramento Valley, being paved and under a hot sun, is an ideal place for mirages, because they require a layer of warm air immediately over the ground in order to be seen.

## THIS MAN MIXES ADVICE WITH HIS AUTO GASOLINE FILLING STATION PROPRIETOR EMBELLISHES BLACKBOARD WITH BITS OF ADMONITORY WISDOM FOR BENEFIT OF CUSTOMERS.

"It is a greater compliment to be trusted than to be loved."

Thus, written in a round hand, reads the brave little blackboard sign on the McGee street trafficway in front of a filling station. There the motor riding public and those who run for a jitney may read some good, honest advice.

The above is today's simple reminder that to pay one's debts and keep one's word is a subject for compliment. Yesterday and the day before and for several weeks past there were other reminders of other homely truths.

The brave little blackboard, in fact,

says things in chalk which the manager of these filling station would not dare say to his customers and still retain their trade. It is impartial. It explains to the occupants of the palatial vehicle and of the humble jitney what is necessary for the cultivation of character, without favor or flattery. Apparently it is a purely altruistic endeavor of the proprietor to do a little good by the side of the road. The admonitions are worded in an original manner and, while they savor of old Benjamin Franklin, they are peppered with modern pep and dusted with modern dust.

- Kansas City Star, 1919

### Unique Publicity.

An ingenious idea conceived by Charles L. Archbold, advertising manager of the National Refining Company, has been attracting more than usual interest and has caused much favorable comment.

The usual type of signs we are accustomed to see displayed at gasoline filling stations have been displaced at the service stations of this company and in their stead Mr. Archbold has erected bulletin boards in the form of huge slates. From day to day axioms, full of "punch and pep," appear on these slates. A few of the more recent are:

"Those who pay cash seldom owe even an apology."

"He who has lots of 'pep' will easily earn his salt."

"Early to bed and early to rise and you don't meet many prominent people."

"The steam that blows the whistle is nothing but hot air."

Proof of the attention getting value of Mr. Archbold's new idea lies in the fact that many men have admitted that they often go out of their way to see the latest "popular proverb."

Indianapolis News

### NOVEL SIGN AT STATION Punch Axioms Used to Advantage at Gasoline Shop.

"He who has lots of 'pep' will easily earn his salt."

"Even the postage stamp can be licked if you do the job behind its back."

"Those who pay cash seldom owe even an apology."

"Some people never crack anything—not even a smile."

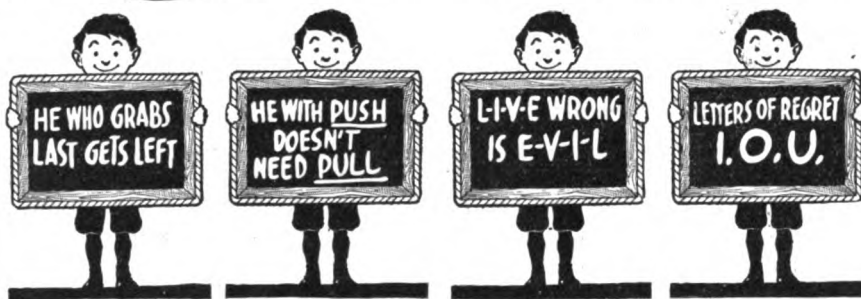
"The steam that blows the whistle is nothing but hot air."

"Many a good physician goes from bad to worse."

"Early to bed, early to rise and you don't meet many prominent people."

These and hundreds of other "punch" axioms appear from day to day on the bulletin boards in front of the National Refining company's White Rose gasoline service stations. The idea was originated by Charles L. Archbold, advertising manager, and replaces the old market price sign.

— Omaha Bee



## The Boy and the Slate Sign They all talk about

They are all talking about the EN-AR-CO Boy and Slate signs. The newspapers and trade magazines are

quoting the witty sayings which are chalked up, day by day, on the big slate.

Nothing in signs has ever made such a "hit" before.

The Boy and Slate sign is over six feet high. It stands out in front of

your place of business. People who pass can't help seeing it, and seeing it, they stop and read.

Reading, they laugh. And they talk about the odd, quaint, humorous sayings. And talking about them, more come to see and to read.

It is a business getter, just as EN-AR-CO Motor Oil and other EN-AR-CO Petroleum products are business getters and business holders. They are the best.

### Write for Our Offer

Write to us for our offer and for particulars about the "Boy and Slate" service, and for prices and other selling helps on EN-AR-CO Motor Oil, EN-AR-CO Gear Grease and other EN-AR-CO brands. We furnish the sign and slogans for every day in the year. Get this offer.

**THE NATIONAL REFINING COMPANY**  
2195 Rose Building, Cleveland, O.

5 Modern Refineries

92 Branch Offices

**THE NATIONAL REFINING COMPANY**  
2195 Rose Bldg., Cleveland, O.

Please send me full detailed information as to your dealer plan, "Boy and Slate" and other advertising helps, and your liberal sales policy.

Name.....

Address.....

City..... State.....

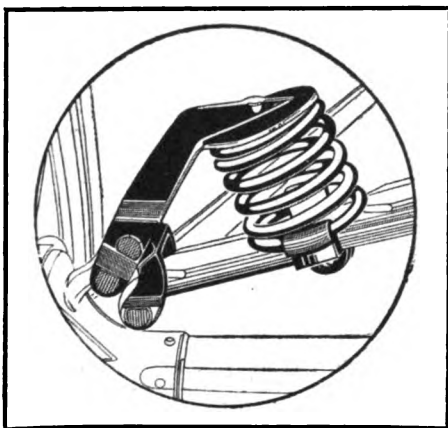
I now sell.....oil

# Accessories—Dealers' Key to Profits

## Glidewell Shock Absorber Makes a Good Christmas Present.

"Don't you think the 'old bus' is entitled to some kind of a Christmas gift—especially after a year of hard service?" the wide-awake dealer asked his customer.

And after meditating over it awhile, the customer agreed. Together they se-



The Glidewell Is the Car's Gift

lected something appropriate, something to save the old car and its passengers many discomforts, something that would adapt the machine to all-around use—a Glidewell shock absorber.

As will be noticed in the accompanying illustration, the regular Ford construction is not changed, nor is it necessary to take off the Ford wheel with the Glidewell. The normal body weight does not compress the coil springs, thus allowing full range of action for the coil spring when the passenger load is added.

Neither does the Glidewell nullify the action of the regular Ford transverse springs, states the manufacturer, as by the principle of compound leverage employed, the coil spring absorbs the small constant road vibrations which are not absorbed by the Ford springs.

The Glidewell also, by its patented construction, is said to stop the extreme up-throw and prevent tipping or sideways, so common a fault when driving a sedan or coupe.

The Glidewell Mfg. Co. is situated in Richmond, Ind. It will be glad to send trade prices and descriptive literature to all those who write for this matter. Mention the American Garage & Auto Dealer when writing.

## Now Is the Time to Sell the Comfort Accessories to Customers.

There is no time like the present for selling your customers accessories for comfort. And there is nothing more helpful to a driver and to passengers than a vizor for the car—something to assure clear

vision in rain or snow, to eliminate sun and headlight glares.

The Wedler-Shuford Co. is producing a vizor which will appeal particularly to those who appreciate quality in material, workmanship, and finish. It is constructed of No. 18 gage annealed steel. The front edge is rounded up  $\frac{1}{2}$  inch so that water



Comfort in Driving Is Assured by This Vzor.

running off cannot blow back on the windshield. The back edge is rolled over a steel rod, increasing the rigidity.

There are special attaching brackets for closed and open cars. The universal adjusting features are distinctively exclusive.

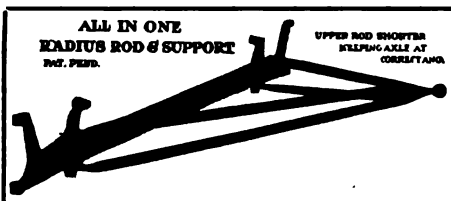
The baked black gloss enamel on the outside surface harmonizes with the finish of a car, and the dull dark green enamel which is underneath is restful to the eyes and prevents reflections.

Write for more complete details and trade prices to the Wedler-Shuford Co., 320 N. 19th St., St. Louis, Mo.

## You Will Like the Tungsten All-In-One Radius Rod and Support.

A combination of the regular radius rod and support, all in one piece, is embodied in the All-In-One radius rod and support just placed on the market by the Tungsten Mfg. Co.

This device fits all models of Fords, both passenger cars and trucks. It is made from four pieces of heavy steel tubing welded



This Radius Rod and Support Fits All Fords.

into one solid piece, the ball being forged out of the tubing, making an absolutely rigid one-piece support for the front axle. It also keeps it at the proper angle, making it easier to steer and steadies the steering wheel itself.

The manufacturer guarantees that the support actually prevents danger of accident through breakage.

Write at once for further particulars to the Tungsten Mfg. Co., Marshalltown, Ia. Mention the American Garage & Auto Dealer when writing.

## Specialization and Standardization In Master Cord Production.

Reduced prices to the distributor and dealer on cord tires for the small car—and, consequently lower prices to the consumer—have just been announced by the Master Tire & Rubber Co.

This reduction in price is the result of the policy adopted in the beginning by the Master Tire & Rubber Co. of standardizing, specializing and concentrating on a quality cord tire for such cars as Fords, Chevrolets, Maxwells, Briscoes, Dorts and Light Overland 4's—the company will make nothing else but this one size and quality.

The saving in manufacturing costs which results from this policy is apparent. There is no capital invested in machinery and stock for the larger sizes—the sizes which sell more slowly. No storage space is required for a number of different sizes. The workmen, states the company, become unusually proficient in building this tire because their entire time and attention is concentrated upon it.

The officials of the Master Tire company decided that if the cord tire was proving so popular and so economical on large cars, it would be equally as satisfactory if used on the small car. Up to the present time very few small size cord tires have been made in spite of the fact that practically 70 per cent of all automobiles driven are equipped with 30x3 $\frac{1}{2}$ -inch rims.

This revealed to the company an immense market for a quality cord tire in 30x3 $\frac{1}{2}$ -inch size, a market so vast that it would easily tax the production capacities of even a large factory to supply the demand that already exists.

Combining all the information and data which was secured through co-operation with the government in building cord tires for airplanes, and combining it with its long experience in making cord tires for automobiles, the company designed the Master cord for the small car.

The Master cord is unique in itself—not a miniature of a large cord tire, but a tire, it is stated, that was built from the ground up for a special purpose and service.

The company was organized in June, 1919, for the purpose of manufacturing these tires in a 30x3 $\frac{1}{2}$ -inch size. A factory was built and the first unit is now operating with a production of 250 tires a day which will gradually be increased to 500 tires a day.

Severe and rigid road tests of every description are said to have proved the durability and ruggedness of the Master tire. For complete details concerning this product, write to the Master Tire & Rubber Co., Dayton, Ohio. Mention the American Garage & Auto Dealer when writing.

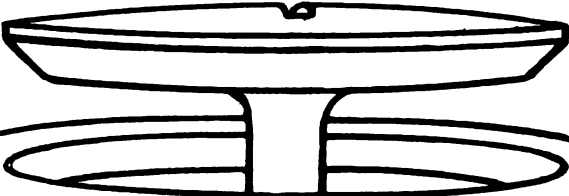




# GRINDING COMPOUND

**Non Freezing**

**Non Drying**



**For Perfect and Profitable  
Valve Grinding, Use "PEP"**

This water-mixed compound has displaced oil-mixed abrasives in every shop *where it has had a trial*. Repairmen and mechanics use nothing but "PEP" after they learn how much better and quicker it does the work.

"PEP" produces a perfectly finished valve face and seat. Water being thinner than oil, distributes the abrasive freely and evenly. When oil is used, the coarser particles, traveling in ruts, forms grooves and rings that are often visible even after the finish is applied.

"PEP" seats a valve in *Half the time* ordinarily required. There is only one operation, because you use only *one grade* of abrasive which combines the cutting and finishing grades of other compounds. The low viscosity of water produces an acceleration of movement and friction that speeds the completion of the job.

"PEP" is convenient to use as only a water dampened cloth is required to wipe the valves before and after grinding. No dry or cracked hands from using gasoline or kerosene.

You are invited to test "PEP" and prove our claims at our expense. Send in the coupon today.

**WORCESTER ABRASIVE CO.**  
1662-1664 Broadway New York City

*Refer to list of Jobbers handling "PEP" shown in our advertisement in Automobile Trade Directory—"The Red Book"*

**FREE**

WITH YOUR JOBBER'S O. K.  
ON THIS COUPON WE WILL  
SEND YOU A HALF-POUND CAN  
OF PEP (Value \$1.00 List) FREE

**FREE**

Your Jobber wants to sell you the best Grinding Compound, but he is too busy to make a test of every brand. To prove the superiority of "PEP" we are willing to go to the expense of sending you free a half pound can (value \$1.00 list) under the following conditions. Clip this coupon and send it to your Jobber with request that he O. K. and forward to us. Also with the understanding that you will report to him the success of your test of "PEP".

(YOUR JOBBER'S O. K. NECESSARY)  
(To Your Jobber):

Gentlemen:—We would like to make a test of PEP in accordance with their proposition. Kindly O. K. and forward this coupon to the Worcester Abrasive Co. so that they will send us a half-pound can of PEP (value \$1.00 list) for testing purposes. I will let you know the results of this test.



**JOBBER'S O. K.**

Please send the party whose name is written above, a half-pound trial can of "PEP."



1662-1664 Broadway **WORCESTER ABRASIVE CO.**

New York

### Tell Your Customers to Add These Accessories to Their Lists.

Tire destruction through under-inflation caused from slow valve leaks, is a great evil—and there has long been a search for

On one of these trips, a traveler happened to have a blowout. The more he tried to patch the tire, the worse it got. Slip, slip, the patches would. "Now I see it," said the traveler. "What I need is a

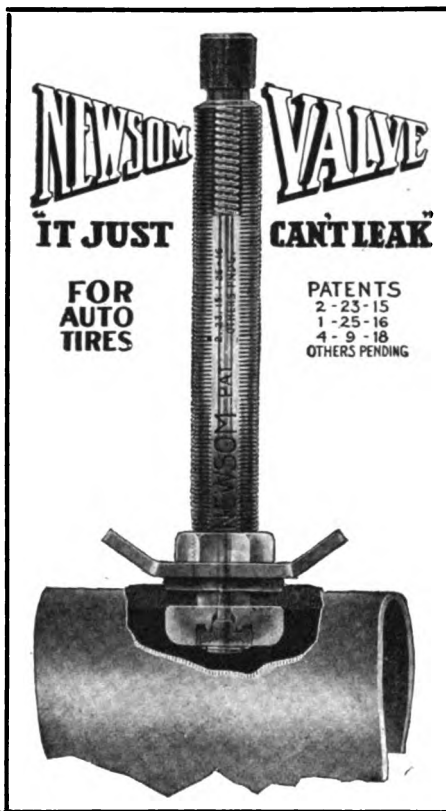
frame are made of malleable iron, and all other fittings are of steel.

The cylinder of the Inland pump—3 by 6½ inches—is a seamless drawn steel shell, with smooth bore. The piston is ¾-inch thick metal washer encased in heavy, high grade, oil-treated leather. After many years of service it can be easily replaced when replacement becomes necessary.

The pump is equipped with seven feet of the highest grade braided rubber tubing with a gage. On one end is a screw connection. On the other end, a quick-acting Lox-On air chuck. The Lox-On chuck—well known to the trade—simply slips over the valve and grips it. That's why the rubber lasts indefinitely and it is absolutely guaranteed not to leak.

The size of the Inland lever pump when folded is 3½ ins. by 4½ ins. by 13½ ins.

Write at once for further particulars to the Clarkson Co., 139 North Clarkson Court, Chicago. And when you are writing, don't forget to mention the American Garage & Auto Dealer.



Valves and Dust Caps Are Efficiency Accessories.

a successful remedy. The R. T. Mfg. & Sales Co. solved the problem by producing the Newsom valve—a device that "just can't leak." This valve is guaranteed by its manufacturer to not only positively stop leakage—but to afford a marked increase in the life of every tire on which it is used.

Furthermore, it will outwear the best inner tube made. There are no plungers or parts to replace. Once in the tube the Newsom valve needs no further attention. In short, this valve is one of the greatest steps forward in tire engineering since pneumatic tires have been in use. It is furnished in three sizes—standard, Ford, and truck.

The R. T. Mfg. & Sales Co. is also placing on the market its Snap Lox dust cap,—a dust cap with which there is no unscrewing or screwing at inflating time. This dust cap fits any valve stem, snaps on readily, and is just as easily detached.

Dealers wishing further particulars—write at once to the R. T. Mfg. & Sales Co., 3847 W. Madison St., Chicago. When you are writing, don't forget to mention the American Garage & Auto Dealer.

### A Trip Without Tools Leads to Invention of a Sure-Hold Tire Cement.

In the mountains of California or the deserts of Arizona, riding in either a Packard or a Ford, your customers know what a blowout means—it means work.

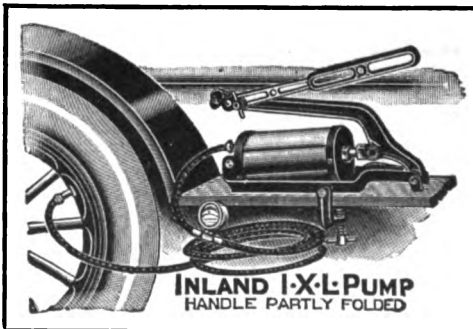
cement to make those patches 'stay put!' And that traveler invented something.

It was Farr's Sure-Hold tire cement and Stay-Put patches. Mr. Farr, for the traveler was he, then formed a company for manufacturing them and today, if you wish further particulars as to the way to make patches "stay put," write to the Farr Sure-Hold-Tire Cement Co., 114 Lawrence St., New York City, and complete details will be sent.

Mention the American Garage & Auto Dealer when you write for further particulars of this cement.

### The New Inland Lever Pump Is in the "World's Best" Class.

If your customers are looking for a tire pump that is powerful, efficient, and compact, do not neglect to tell them about the



An Easily Operated Tire Pump.

Inland lever pump manufactured by the Clarkson Co.

A woman or child can easily and quickly inflate tires to 90 pounds pressure with this pump. It quickly clamps to either running board, and can be carried in a tool box without taking up much space or crowding out essential tools.

A patent folding handle closes in contact with the cylinder. Opened, the handle is 25 inches in length. Both handle and

### Announcing the "Birth" of the Instant-Pep-Co Piston Ring.

Adorned with blue ribbons and a picture of a formidable stork, the "birth announcement" cards of the Instant-Pep-Co piston ring recently sent out by the Pennsylvania Piston Ring Co. have been and will be received with acclamations by the trade.

After eight months of continuous and exhaustive experiments, both with block cylinders as well as several cars, the company has brought out a ring which it says is meritorious in design and construction. The processes and methods of casting, as well as the machining of the ring, are claimed to be such that it will fit as a perfect circle all around the cylinder wall, which means that at no point in the ring will there be any leak to permit gas vapor to pass out from the combustion chamber or oil to pass into the combustion chamber.

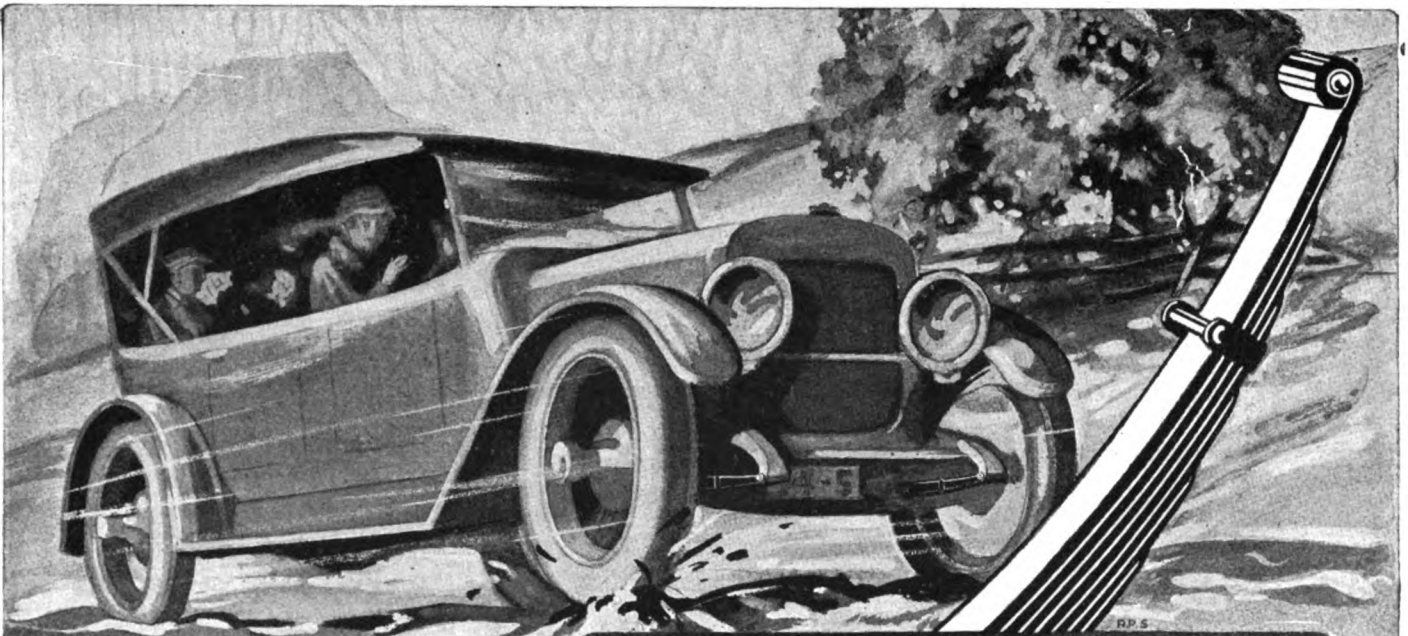
It will, furthermore, exert absolutely uniform pressure all around the cylinder walls, which means that there will be no excessive pressure at any point of the ring so as to wear the cylinder oval or insufficient pressure at any point of the ring so as to allow a leak.

The ring is so constructed that no tools or skids of any kind are required in mounting it on the piston. This not only makes it very easy to mount on or take rings off the piston, but also eliminates the possibility of distorting the ring in any way during the operations.

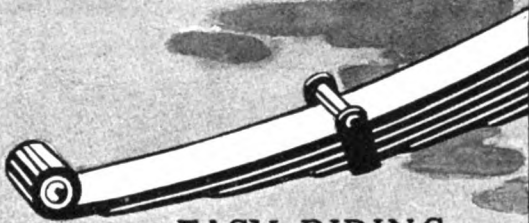
"Instant-Pep-Cos" are made out of individual castings.

The piston rings are packed in round cartons, one dozen to each carton.

If you wish to join the Pep-Co family, write at once for descriptive data. The Pennsylvania Piston Ring Co., 203-205 St. Clair Ave., Cleveland, Ohio, will send it on request.



## The Test That Tells



EASY RIDING  
GUARANTEED

**Harvey**  
**RACINE**  
BOLTLESS  
AUTOMOBILE

# SPRINGS

THE unexpected bump, the sudden terrific strain—that's the real test of a spring.

Ordinary springs may seem satisfactory for ordinary driving, with good roads and good luck.

But! Every motorist sometimes meets the emergency. Ordinary springs are not enough. He must be prepared beyond risk.

Harvey Boltless Springs are built with the emergency in mind. They are guaranteed to pass the test that tells.

The motorist asks the dealer's judgment. Can the dealer recommend a spring of less than Harvey standard?

*Write today for the Harvey Book, giving specifications for 1500 kinds of Harvey Springs. Ask the name of the nearest Harvey jobber.*

**Harvey Spring & Forging Co.**  
104C 17th Street      Racine, Wisconsin

# Up-to-the-Minute Garage Equipment

## The O'Brien Heavy Duty Grease Pump "Does Your Dirty Work."

Was there ever a time when a garage-man didn't have need of a device that would handle heavy transmission greases or oils without waste?

For those who insist upon complete equipment, the Grease Pump Mfg. Co. is presenting to the trade the O'Brien heavy-duty grease pump by which heavy trans-



Speed and Efficiency Are Embodied in the O'Brien Pump.

mission grease, as well as oil, can be speedily handled.

One man can fill the most inaccessible transmission or differential in a few minutes, and do it without getting grease on the car, floor, or himself. This pump will handle any weight of grease used in an automobile transmission or differential, measure it accurately, and will do its work quickly.

The tank of the O'Brien is of No. 18 gage steel. The capacity is 125 pounds grease, or 15½ gallons of oil. Pumps of larger capacity are made to order by the Grease Pump Mfg. Co. The cylinder has a 3-inch bore, and is fitted with an accurately machined piston of special design. Three packing rings are used. The piston is operated by a cut steel rack and pinion. The valve is a 90-degree two-way device, hand-operated, with large port area, and the company guarantees that it is absolutely leak-proof and positive in action.

The handle of the O'Brien pump is made of steel with a reversing ratchet. Two pounds of medium and heavy, or one quart of light lubricant, per stroke is delivered. The gage on this pump has three graduations for heavy, medium, or light grease and will indicate accurately the amount of grease pumped out of the hose, which is special in design.

An O'Brien heavy duty grease pump will fill the average differential or transmission as quickly as the supply of gasoline

and of cylinder oil can be replenished.

Write today for further details and prices. The Grease Pump Mfg. Co. is located at 1412 S. Michigan Ave., Chicago. It will send literature upon request. And when you write, don't forget to mention the American Garage & Auto Dealer.

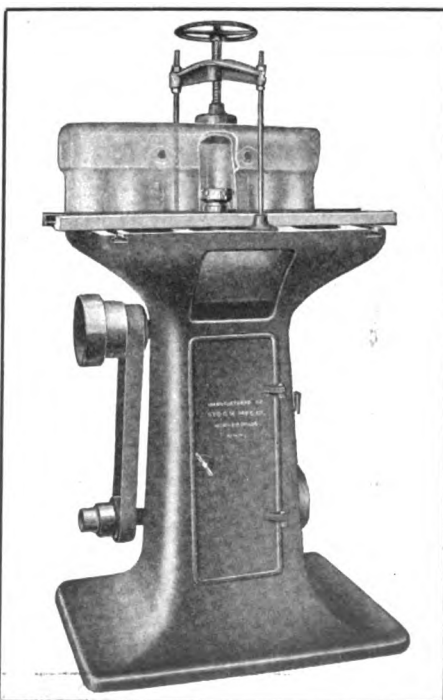
## You Will Find This New Vertical Power Boring Mill to Your Liking.

Confident that vertical construction afforded possibilities for accuracy and simplicity not otherwise attainable, the Storm Mfg. Co. has evolved the Storm vertical power boring mill for automotive cylinder reboring. The vertical design of this mill makes it ideally suitable for boring and re-boring large gears, tractor wheel hubs, heavy bushings and rough castings of unusual dimensions.

The sturdy pedestal body presents a most pleasingly clean-cut exterior. It combines beauty and strength and possesses a rigidity that makes operation of the mill surprisingly quiet and vibration-free.

This pedestal body occupies a floor space 30 ft. by 36 ft. and stands 44 ins. high. Its upper face is accurately surfaced and, equipped with parallel sliding rails and an adjustable overhead clamp, forms a horizontal bed on which cylinder blocks and heavier work may be readily mounted and handled by one person, unaided.

The pedestal body also houses the boring bar, with its driving feed and regulating mechanisms, and insures adequate protection to all of these moving parts.



A Boring Mill Made for Your Shop.

The upper and lower adjustable main bearings supporting the centered boring bar are extremely liberal—8½ ins. and 6 ins. long, respectively—and are an integral part of the one-piece body casting.

The chrome-nickel-steel hollow boring bar is heat-treated, hardened and ground to size. The machine is equipped with two different boring bar feeds, one adapted to general work and the other to fast work. By means of step cone pulleys, the boring speed may be suited to the feed and character of the work.

The boring bar is actuated by heavy feed-screw and cut gears and has an upward travel of over 20 inches.

An automatic time-saving feature makes it possible to set the bar to stop and return to the bottom at the completion of the cut.

Four self-centering, Storm multiple-cutter adjustable type cutter heads are furnished, affording a diametrical boring range of from 2½ ins. to 7½ ins. Special heads to 12 ins. diameter can be had.

The extreme simplicity of operation, the fine accuracy and the unusual adaptability are especially commendable features of this new mill. The shipping weight is 1,200 pounds.

Those wishing further information should write to the Storm Mfg. Co., 6th Ave. & 4th St. S., Minneapolis, Minn. Mention the American Garage & Auto Dealer when you write for further particulars.

## The Hole Shooter "Was Made to Order" for the Repair Shop.

The latest product of the A. H. Petersen Mfg. Co., expert tool makers, is the hole shooter, a small portable electric drill weighing 3¾ pounds.

This reduced weight, which is said to be less than that of any other electric drill on the market, is made possible by an improved design and the skillful use of aluminum, of which the entire case and handle are constructed. But neither power, speed, nor durability have been sacrificed in this accurately balanced drill, says the manufacturer.

Awkward drilling jobs are easily handled with this tool. The operator does not tire as readily as with a heavier drill, and both accuracy and output are claimed to be increased. The hole shooter also effects a saving in drill points.

With its capacity of 3/16-inch holes steel, and ¼-inch in wood, this drill lends itself to a multitude of uses for garagemen. It is a timesaver in drilling small holes for installing clocks, speedometers and cigar lighters on instrument boards, for attaching robe rails or sun visors, and for equipping enclosed cars with mirrors and spotlights.



# A Good Profit in Every Vulcanizing Job with the FIRELESS COOKER TUBE PLATE

Here is a vulcanizer that makes money in slack times as well as in busy seasons. Some vulcanizers can be operated at a profit only when kept constantly busy—to start them up or individual jobs is a losing proposition. When you have a Fireless Cooker Tube Plate you can make a good profit on those jobs that come in one at a time.

This outfit embodies a steam plate, electrically heated and automatic in operation. Just turn a switch and it heats up in twelve minutes. It is its own watchman, turning off and on automatically to hold the steam pressure at 60 pounds.

The cost of vulcanizing a tube is less than one-half a cent. When through, it is switched off and no current is wasted.

The Fireless Cooker Tube Plate is portable and can be used on your bench or wherever desired.

This vulcanizer materially reduces your insurance rates as compared with a gasoline vulcanizer.

## Price \$50.00

Backed by a written guarantee.

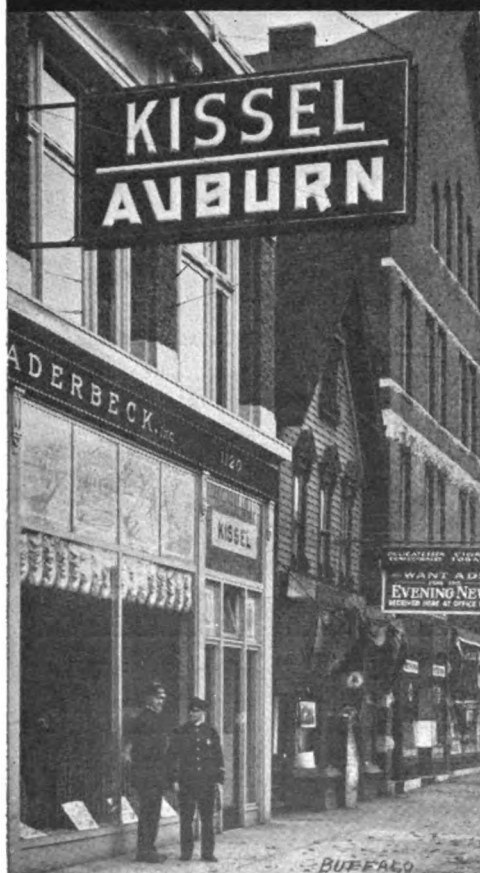
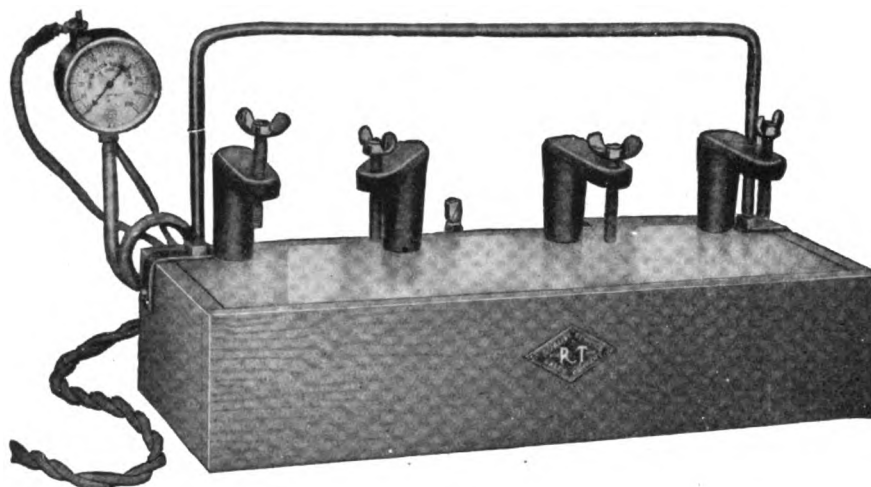
For satisfactory, economical and profitable vulcanizing, the Fireless Cooker Tube Plate is without an equal. Order one today or write for full particulars.

**R. T. MFG. & SALES CO.**

Sales Dept.

3847 W. Madison St., Chicago, Ill.

"Everything for Repairing Tires"



## You Don't Have to Ask What Car They Handle

**M**ANY of the most attractive sales rooms are using Oplex Electric Signs to "tie" the manufacturers' national advertising right to their doors. People know the car through the advertising. The Oplex Sign shows them where it can be bought. Everyone will know where they can buy the cars you handle if you have an Oplex Sign.

Raised, snow-white glass letters on a dark background—that is what makes Oplex Signs different from the others, the thing which gives the whole storefront the mark of quality.

Oplex Signs are perfect day signs as well as night signs—raised white letters on a dark background, solid letters of light by night. They have greatest reading distance, lowest upkeep cost and most artistic designs.

The Flexlume designers will be pleased to send you a sketch showing how *your* Oplex Sign will look.

### THE FLEXLUME SIGN CO.

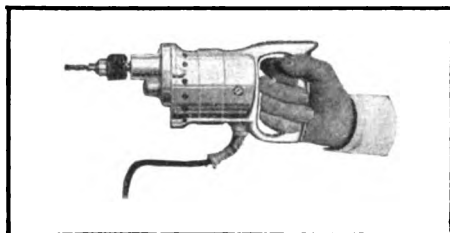
Pacific Coast Distributors:  
Electrical Products Corp.,  
Los Angeles, Cal.

**ELECTRICAL ADVERTISING**  
Niagara & Potomac Ave., Buffalo

Canadian Factory  
The Flexlume Sign Co. Ltd.  
Toronto, Ont.

The hole shooter has a universal motor, operating on either direct or alternating current. It develops a speed of 1,600 revolutions per minute; it is furnished with either 110- or 220-volt windings. A centrifugal fan keeps the motor cool, even under the severest working conditions.

All parts are interchangeable. Gears are



The Drill Weighs 3¾ Pounds.

cut from nickel alloy steel, heat-treated by a special process. A high-grade ball bearing of super-thrust capacity carries the front end of the spindle shaft. The spindle is offset for close work in awkward places.

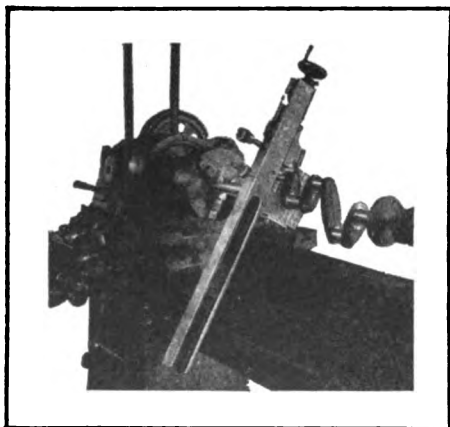
A Cutler-Hammer push-button switch, located in the upper part of the revolver-like grip, gives instant control of the current. The hole shooter is regularly equipped with a Jacob's chuck, and is furnished with 10 feet of cord and plug.

For further particulars write to the Petersen Mfg. Co., Milwaukee, Wis. Mention the American Garage & Auto Dealer when writing.

### Do You Want to Keep the Profits in Your Own Shop? Read This!

"Why not do the profitable jobs in your own shop? You can save your customers' time and money and give them a far more satisfactory job. Why not put additional profits in your own pocket?" asks the Sawyer-Weber Tool Mfg. Co., manufacturer of Weber crankpin re-turning tools.

You know it is impossible to fit a bearing



Keep the Profits in Your Shop with the Weber Tool.

to a flat pin. More time is saved in fitting the bearing to the round pin than is taken to true-up the pin with a Weber tool, says the company. With this tool, which is the result of many years of experience on crankshaft work, it is possible to true-up pins or throws of any crankshaft in an

ordinary lathe without offsetting or filing. All of the pins are finished from the one setting—on centers. The Weber tool is claimed to not only make an absolutely round pin, but it removes all taper and leaves the pin parallel to a line between the centers of the lathe. This means that the pins are left parallel to the main bearings.

Any shop having a lathe of not less than 15 inches capacity and a Weber tool, can re-turn crankpins in from 15 to 20 minutes to the pin (including the polishing operation). And a machinist of only ordinary ability is required, not a specialist, says the company.

Those who have used the Weber crankpin re-turning tool, indorse it highly. In the shop which has the Weber tool, the customers will find no delay. When the crankpins are re-turned, there will be a net profit of from \$5 to \$10 a shaft to the shop owner, and the customers will all be the boosters for him, the manufacturer states.

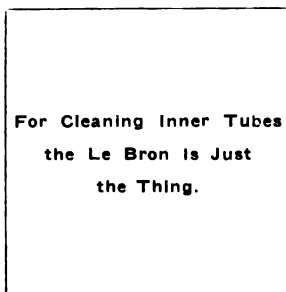
Write for further particulars to the Sawyer-Weber Tool Mfg. Co., 356 South Alameda St., Los Angeles, Cal. Mention the American Garage & Auto Dealer when writing for further details.

### This Inner Tube Buffer and Grinder Will Save That Valuable Time.

No doubt you have seen the Le Bron inner tube buffer and grinder for it is proving exceedingly popular with the trade, but in case you have not, we are going to tell you about it.

For cleaning inner tubes it is just the thing. In a very short time this equipment will pay for itself—and, perhaps, the most admirable feature is that it will guarantee a perfect patch for it puts the surface in condition to take a cold patch or to be vulcanized. And the surface absolutely will not be burned. The motor is built in one size—¼ horsepower. Either alternating or direct current can be used.

Of course, you will want further particulars. Write to the Le Bron Electrical



For Cleaning Inner Tubes  
the Le Bron Is Just  
the Thing.

Works at 318 S. 12th St., Omaha, Neb. And when you are writing, don't fail to mention the American Garage & Auto Dealer.

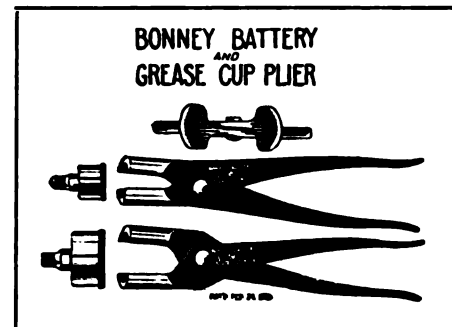
### A Garageman's Efficiency Depends Largely Upon His Efficiency Tools.

Having the tool "for the work" is half the battle. A garageman cannot afford to

be without proper equipment in his shop.

Battery plates are attached to battery posts. These plates become corroded and stick and are hard to remove. As the post is cylindrical, it is difficult to grip it hard enough to get a firm pull.

Bonney battery and grease cup pliers, because of their design of jaw and cross mill-



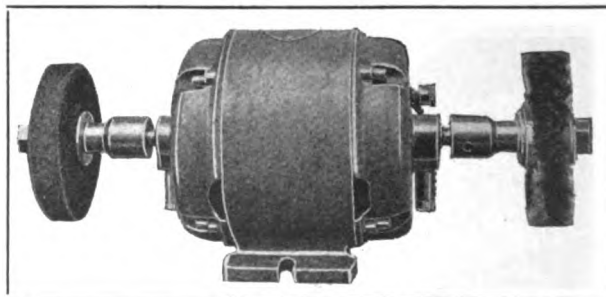
These Pliers Fill a Special Need.

ing, fill a need for a plier with an end-twist or end-pull for handling grease cups or for gripping battery posts, terminals, and the like. The cross milling allows a firm grip which will hold the cylinder firmly enough to pull out the tightest set of plates.

The action of Bonney battery and grease cup pliers is from any angle. The teeth are cross milled in double concave jaws. The adjustment rivet slides between two holes on either of which it operates. There are two adjustments—one for small posts, terminals and grease cups, and the other for large posts, terminals and grease cups. The action is the same in either adjustment.

There are many other uses to which these special pliers may be applied, but even if no further use could be made of them than for battery posts and grease cups, these tools would be invaluable in the garageman's kit.

The Bonney Vise & Tools Works, Inc., Allentown, Pa., will be glad to send trade prices and more complete details to all those who are interested in such pliers. Mention the American Garage & Auto Dealer when writing for this information.



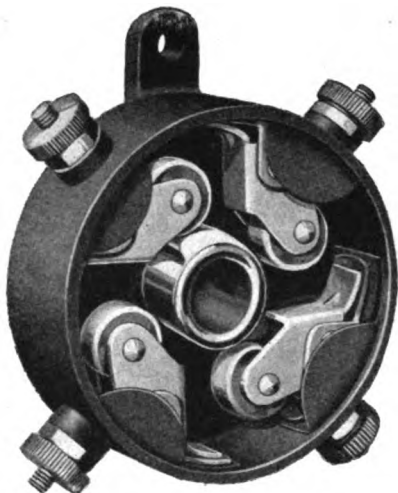
### Ready for a Busy 1921? With Boe Products You're Always Ready.

When the new year comes in, you want to be prepared to land your share of the business. Too much emphasis cannot be laid upon the need of proper equipment.

For instance, speaking of proper equipment, there is the new Boe valveless grease bucket which the manufacturer claims is in

## IS YOUR FORD TIMER A THIEF?

Every time it misses it actually steals 25% of your Gas. Every time it delivers a weak spark half your gas is shot out half burned and wasted.

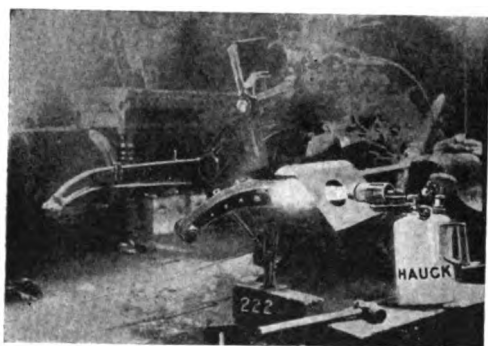


### DUNTLEY 4 UNIT TIMER

Producing a bigger, hotter, more constant spark, the Duntley forces every atom of gas to yield its full measure of power, eliminating waste and effecting a tremendous saving in fuel.

*DEALERS: It sells on sight. A postal will bring full details.*

**J. W. DUNTLEY, 1004 Michigan Ave., Chicago, Illinois**



### Twisted Chassis Straightened in 6 Minutes with a Hauck No. 14 Kerosene Torch

A piece of sheet iron bent in the manner shown in the illustration was used to confine the heat to the part to be straightened, which became cherry red in less than 5 minutes.

The powerful, blue-red flame of the burner is clean, without smoke or soot. The burner is made of special heat resisting metal, without coils. All the oil passages are straight and can easily be cleaned. The oil valve has a ball check to prevent the hot oils from the burner returning to the tank.

A new feature of the Nos. 14 and 15 sizes, is the priming pan valve.

Besides straightening, the Hauck Torches are used for expanding, brazing, soldering, preheating and melting babbitt out of bearings.

*Write for prices and copy of Bulletin No. 104  
"Quick Auto Repairs"*

**HAUCK MANUFACTURING COMPANY**

126-134 Tenth Street, Brooklyn, N. Y.

# NEW ERA

## "Better" SPRING BUMPERS



Sound quality features are the strongest selling points and a New Era, neater, lighter, stronger, has all the best of the argument in efficiency for the driver as well as rapid sales and quick turn-over for the dealer.

Sell every customer two New Eras—one front and one rear. Explain correct principles of construction, quote our guarantee as a proof of quality, tell of the underwriter's endorsement and the lowered insurance rate as an economy argument and you will find New Eras one of the best paying items in your stock.

Prices: Fords (rear) black \$12.50, nickel \$14.00  
(front) " \$10.50, " \$12.00

*Write for Catalog on New Era  
"Better" Tire Carriers, Springs  
and Spring Bumpers.*

**NEW ERA SPRING & SPECIALTY CO.**  
56 Cottage Grove Ave. Grand Rapids, Mich.  
Graf Sales Co., Hearst Bldg., San Francisco

the "very best" class of grease-dispensing machines. The construction of this bucket is extremely simple. There are no valves. The piston operates air-tight. The entire lower end of the pump cylinder is wide

stroke. No more lifting or rolling of heavy barrels. Simply roll the truck up to the barrel, hook it on, then lay it down.

This truck makes any barrel a portable grease tank, and it is ideal for handling any

—quick in action and suitable for work of any length. This press has steel channel construction for strength. The reversible ratchet wheel has ball-thrust bearings. The wheel is located between two heavy malleable castings. Very small floor space is required.

The channel cross bars are instantly interchangeable. And the screw does not turn.

The whole press is finely finished in battleship grey, and it is made in sizes to meet all requirements. It is one of the Greb "masterpieces."

Then the manufacturer has designed the Greb rear axle press for removing axle and drive shaft gears and pressing on axle gears.

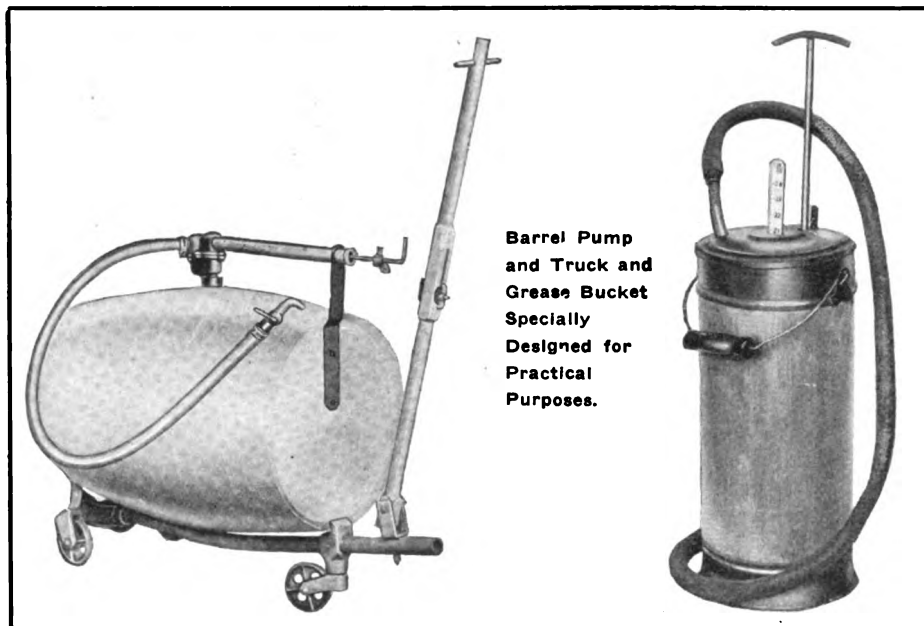
The capacity of the shafts is up to  $1\frac{1}{2}$  inch and that of the gears to  $6\frac{1}{2}$  inches. It will remove connecting-rod wristpins, timing gears, and spindle body bushings. It also can be used for straightening connecting-rods or other small work.

By pushing the base plate to one side, a solid base is procured for the axle to rest on; by pushing the plate in the opposite direction, the hole centers with the hollow shaft allowing the axle to pass through the base.

The press may be secured in an upright position or can be used horizontally by means of a hinge. When in a horizontal position, it can be used on work of unlimited length. The press is of malleable iron construction throughout. It is 36 inches high. The shipping weight is 75 pounds.

Those interested in this new equipment can obtain more complete particulars from The Greb Mfg. Co., Inc., 172 State St., Boston, Mass.

Mention the American Garage & Auto Dealer when you write.



Barrel Pump and Truck and Grease Bucket Specially Designed for Practical Purposes.

open on the intake stroke, but closes automatically on the discharge stroke.

A unique measuring indicator graduated to show both pounds and pints is furnished. The new three-way pump will win instant favor. It pumps grease out of the bucket or into it and will handle other gear lubricants without disturbing the contents in the bucket. The pump stroke is also adjustable for pounds or pints, making a double check on measuring.

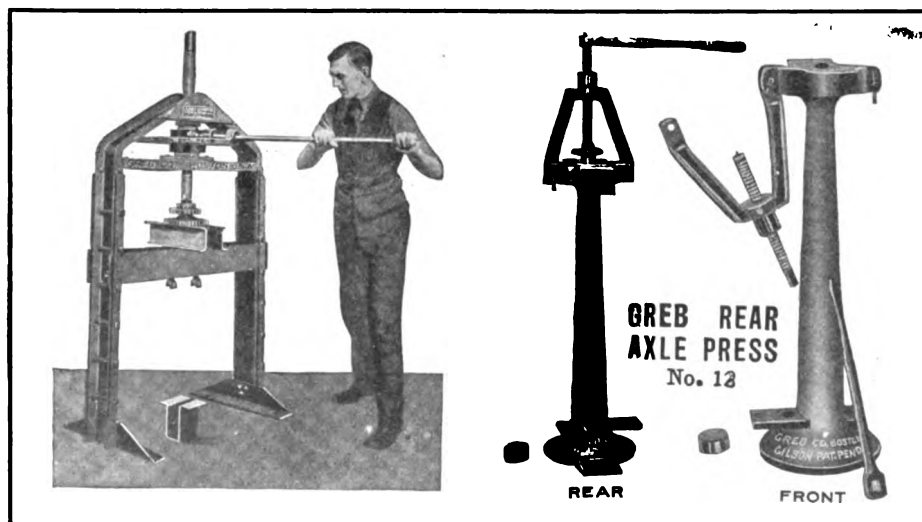
Then the Boe Mfg. Co. has another product which will meet with your approval. It is a lever-action barrel pump and truck

25 to 60-gallon wood or steel barrel. The manufacturer claims that it is the most durable, quick-operating, simple, efficient and unique outfit of its kind.

All those who are interested should write at once to the Boe Mfg. Co., 941 East Hennepin, Minneapolis, Minn., for literature and trade prices. And be sure to mention the American Garage & Auto Dealer.

### Greb "Best Bets"—Practical Presses for the New Year Equipment.

There is no better time than the first of the year for buying that new shop equip-




Greb General Purpose and Rear Axle Presses Are "Built Strong."

which in a few seconds can be put up ready for business. The truck tongue acts as a pump handle for operating the grease pump. The piston stroke is adjustable to dispense  $\frac{1}{2}$ -pound or  $\frac{1}{2}$ -pint to each pump

ment that you have been contemplating so long. And the Greb "Best Bet in Presses" will sooner or later come to the attention of progressive garagemen.

There is the Greb general purpose press



## Victory Visible Gasoline Pump

Gives everybody a square deal.

Puts an end to leaks and losses for the Dealer and wins the confidence and the trade of the motoring public.

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LOOSE LEAF

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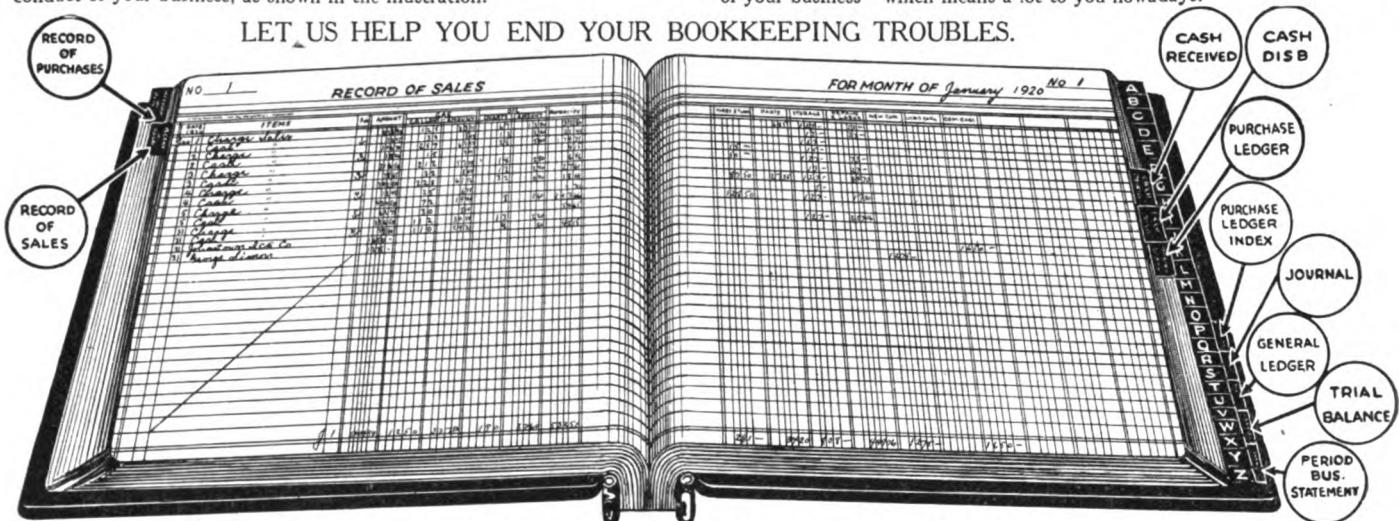
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W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

**Over 350,000 sets now in use**

Is adequate proof of the superiority of W. & C.'s. Ford users have earned to appreciate easy riding qualities secured through these shock absorbers.

**Price \$12.00 per set of four.**

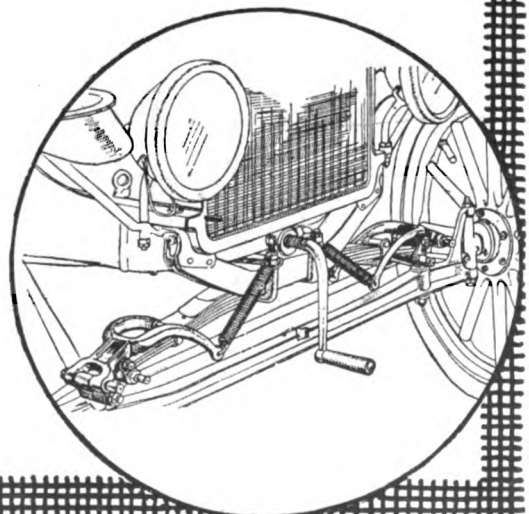
DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

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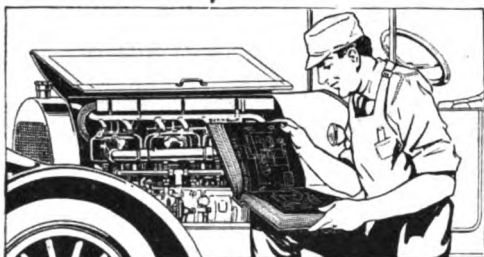
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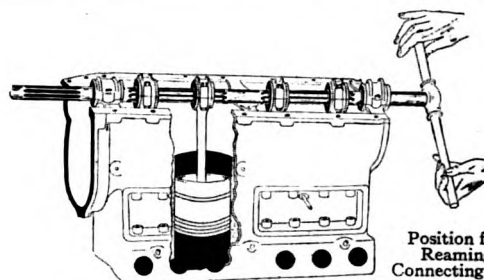
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Connecting Rods

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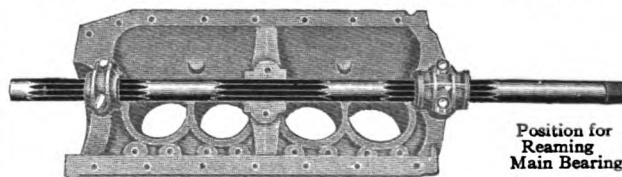
in more ways than one. It takes only an hour and a half to ream the seven bearings in a Ford motor as against eight hours by the hand method. Your labor cost is further reduced by the fact that you do not need a high priced mechanic to operate your Lewis Reamer. Any man in your shop can do satisfactory work on either connecting rods or main bearings.

Your customers will be highly pleased with the perfect work turned out by your Lewis Reamer. The first three jobs pay for it.

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Position for  
Reaming  
Main Bearings



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volumes for the character and ability of the bearer and the house he represents. The firm, bristly bristol board with its clean-cut, perfectly formed engraved letters denotes a care and attention to details which the recipient subconsciously associates with the product and policy of the firm represented.

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will  
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if they fail to duplicate any part of any make of automobile or truck foreign or domestic, submitted to them. That sum will be paid to the person sending the order.

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They have the largest and best equipped plants in the United States for the repair or reproduction of automobile parts.

Cylinder regrounding, new piston, special casting, heat treated, Pondelick's self-adjusting, anti-leak piston rings, new wrist pin, hardened and ground, bushing made of genuine bronze, including fitting and assembling of connecting rod to piston for \$15.00.

Reputation, not competition, determines our policies. Visit our plants and be convinced. Ask anywhere or anybody about our work.

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Main Office, Leavitt St. and Jackson Blvd.

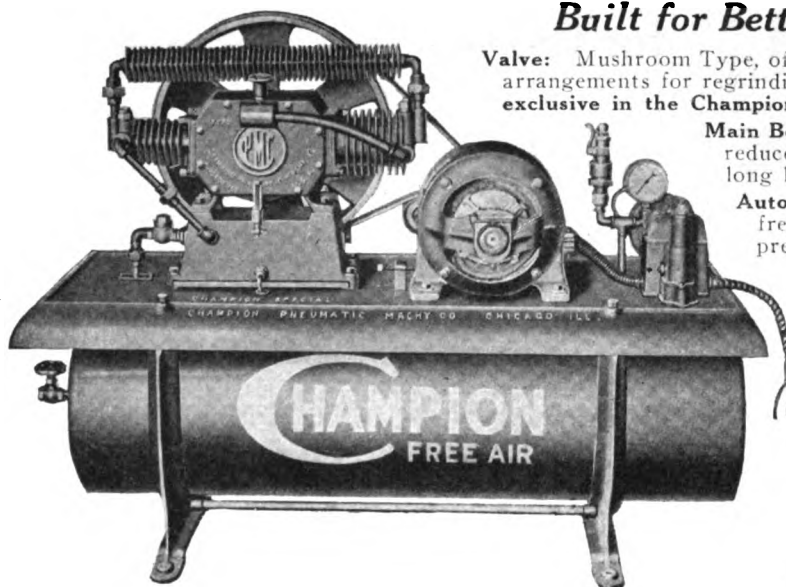
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Garagemen pay for the air they give their customers "free." What your bill will be depends on the upkeep and operation costs of the air compressor. Save your money and win goodwill. Choose the compressor that does not require tinkering—keeps up the pressure and keeps down expense. Use

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*Built for Better Service in Every Detail*



**Valve:** Mushroom Type, of large area housed in bronze cages, with special arrangements for regrinding; seated by air pressure (a patented feature) exclusive in the Champion.

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The **MODEL "N" MARVEL CARBURETER** improves car performance, and will increase your mileage from 18 to 25 per cent.

No changes are necessary to install it. Fits right in place of regular installation.

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*Designed especially for FORDS*

sold on 30 days' trial, with money back if not satisfactory.

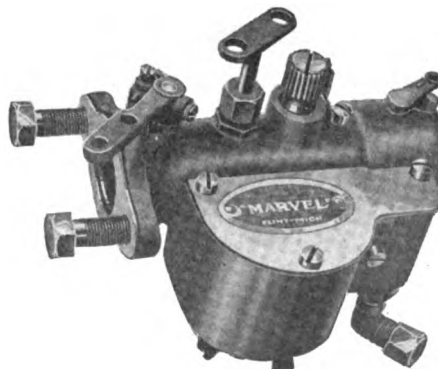
Price F. O. B. Factory \$10.00

**MODEL "E" CARBURETERS** are standard on Buick, Oakland, Nash, Scripps Booth, GMC, Wilson and all  $\frac{3}{4}$ -ton U. S. A. Government Trucks.

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**Reduce Heating Costs One-Half**

Operates for one-half less than coal. Is **safer, cleaner, quicker** and better in every way. Has no superior for heating garage, offices, supply rooms, etc. Patented wickless metal burner lights with a match. Gives **instantaneous heat**. No waiting. Burns plentiful kerosene. Heats large spaces easily. Absolutely **odorless. SAFE. Guaranteed**. No coal to carry or ashes to dump—no smoke—no flying sparks. Always under perfect control.

**INVESTIGATE** Write for book "The Sensible Heat for You." Gives low factory prices, description and proofs of superiority. Sent **FREE**.

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Very truly yours,  
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The roominess of Finck's Garments means the utmost comfort, no matter what position you work in. They are made big to begin with and fit after washing.

There's no binding, no tightness, and no straining, and because they fit they wear. That's guaranteed by the "Pig" label. Ask your dealer or write to us for your next suit.

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Sold by dealers everywhere, or prepaid on receipt of price.

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## HOLD 'EM IN THE ROAD

Gives the Ford driver better control over his car, preventing breakage, repairs and accidents.

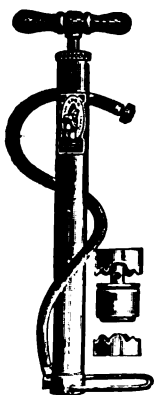
Combines four valuable attachments in one—Radius Rod Brace, Anti-Rattler, Axle Support and Steering Device.

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The Rose Tire Pump's best advertisement is the satisfaction it gives. You can judge that from the fact that there are over 2,500,000 Rose Pumps in use today. Motorists know this pump, and they are buying large numbers of them every day. It's the pump that has made tire pumping so easy. If you want quick, easy sales, with good profits, sell the Rose Tire Pump. Write to your jobber today for information.

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Waiting for lower prices before ordering that equipment you need or stocking these accessories your customers want is like sitting on a fence and waiting for your rich uncle to die. You lose more than you can possibly gain by a drop in prices.

To make 1921 your best year buy your requirements NOW.

**AMERICAN GARAGE  
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## A little grinding compound plus your ECLIPSE makes a perfect valve



It requires only a minute or so with the grinder and both valve face and seat are smoothed to a clean, hard finish—absolutely gas tight. No grooving or scoring—the rapid oscillation prevents all that and the slow rotation insures an equal amount of treatment to every part when you use the

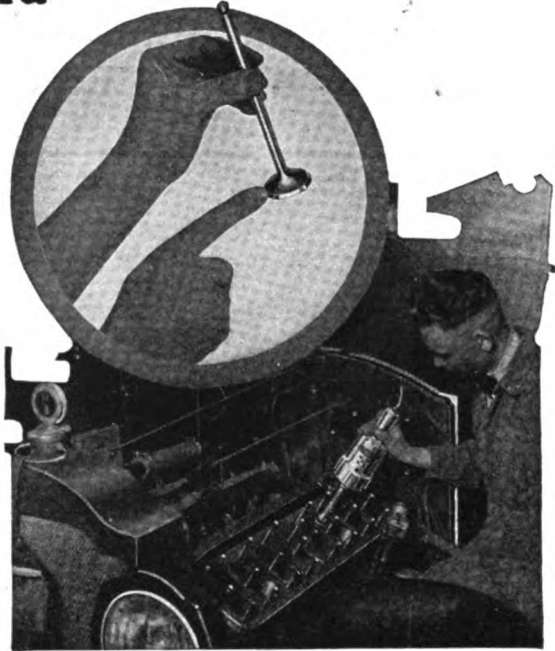
### ECLIPSE ELECTRIC VALVE GRINDER

This tool sets a new standard in valve grinding and makes it a simple, easy task. It reduces the time and labor required to such an extent that the profit on each job is greatly increased.

It takes all the drudgery out of valve grinding. One hand suffices to guide the grinder and seat the valve perfectly.

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Write today for full description.



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The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

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Write today and feel free to consult our Engineering Department.

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*Prices and samples of Core on Request*

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DEPT. B

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**THE GRIP OF A BULL-DOG**

**FARR'S**

**SURE-HOLD-TIRE-CEMENT**  
and **STAYS-PUT-PATCHES**

**COMPLETE KIT**

**SOLD EVERYWHERE**  
or send 60c for sample kit

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QUICK SHIPPERS  
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FOR THE "BIG FIVE"

**Motor Car--Motor Truck--Tractor--Motor Boat--Aeroplane**

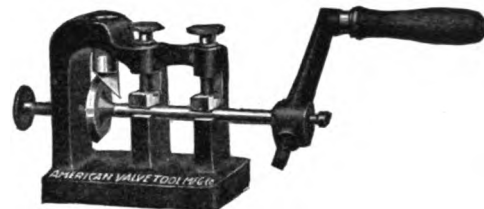
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**AMERICAN ADJUSTABLE VALVE TOOLS**

With these tools anyone can true to a perfect point of accuracy, any angle or degree—and size valve and seat 1" to 3" inclusive.

OVER 30,000 IN USE

Write for circular "B"

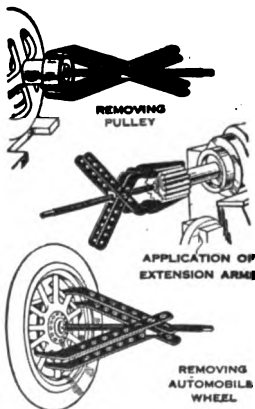
**AMERICAN VALVE TOOL MFG. CO.,** 354 W. 50th St. NEW YORK

**Watch for this Tag**

It will introduce to you a complete line of automobile repair equipment, tested and used by leading Service Stations and backed by the "Fairbanks O. K." Sold by leading jobbers everywhere.

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**"LITTLE GIANT"**  
**GEAR AND WHEEL PULLER**

Pulls any gear, wheel or pulley anywhere in a jiffy. Built on the only correct principle. Produces maximum efficiency with minimum effort. Can't twist off or let go. **THE HARDER THE PULL—THE TIGHTER THE GRIP.** Reduces operating cost and increases the earning capacity of any Repair Shop. Made from best grade drop forge steel. Almost unbreakable. Adjustable up to 13 inches diameter. Satisfaction guaranteed or money refunded. Order or write for details today. Price complete with extension arms, \$12.00.

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You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

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The Weber Tool turns ALL Pins from ONE setting of the Crank Shaft, ON CENTERS. It is the only Tool of its kind that will leave a pin absolutely parallel to the main bearings. The cutter used is a Forming Tool, cutting entire width of pin at once. A micrometer dial enables operator to gauge his cuts and turn all pins to a uniform size.



Perfected and Proven

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How many times have you assembled a gas engine, knowing full well that the crank shaft needed trueing up? You did not want to send it out and delay your customer. You knew, too, that it would cost considerable to have it done.

With the Weber Tool you can do this work whenever necessary. NO DELAY—NO EXPENSE.

Why not do this work in your shop and have more satisfied customers and put more profits in your own pocket?

The Weber Tool is guaranteed to turn crank-pins within as close limits of accuracy as any other known method.

Picture at top shows Weber Tool in operation on 4-throw Crank Shaft. All four pins are turned and finished from this one setting. Write for Circular and prices or ask your jobber.

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Just roll it up beside the car, set the gauge and run the handle down. The most inaccessible transmission or differential can be filled in two or three minutes. Not a spot of grease on yourself, car or floor. Neither is there a trace of it wasted. And there's 10 to 20 minutes saved each time.

Handles all weights of grease as well as oil.  
Capacity 125 pounds or 15½ gallons oil.

Discharges two pounds of grease at one stroke of the piston.

High quality and workmanship guaranteed.

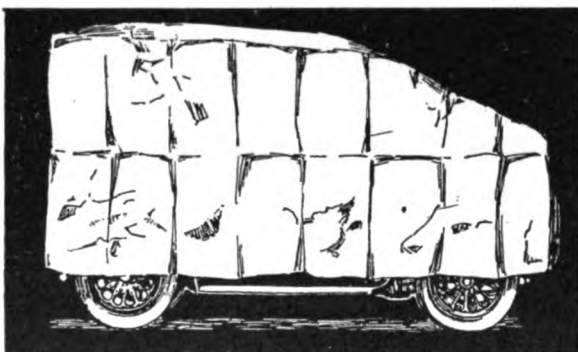
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Ask your jobber about them or write us for complete information.

**The  
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1500 Michigan Blvd.  
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(Patented)



Increase the profit of this  
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## KENNEDY Auto Covers

the most effective and economical means of protecting cars in storage from dust, dirt, rust, and cold. Car owners readily appreciate the value of Kennedy Covers and you make a good profit on each one used. They are a drawing card for your storage business, and are also quick sellers to car owners who keep their cars in their own garages. Made of strong heavy paper, properly reinforced, and correctly designed in standard sizes to fit any car.

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### Combination Automobile Screw Plates

serve best on automotive work because they were designed expressly for garages and repair shops.



Set shown in illustration enjoys a well deserved popularity in the automotive field.

Contains in one set—both U. S. Standard and S. A. E. Standard taps and dies—thus saving the expense of buying a separate outfit of each.

Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

Write for Catalog No. 18.

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Union Twist Drill Co.

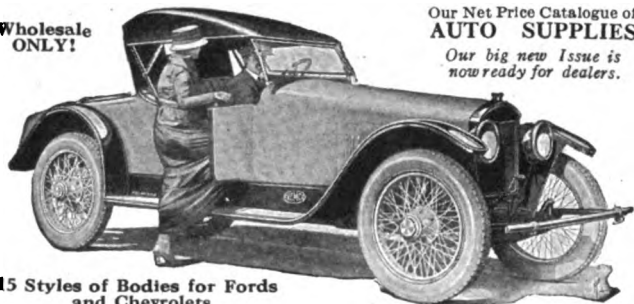
Derby Line

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Wholesale  
ONLY!



15 Styles of Bodies for Fords  
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Our Net Price Catalogue of  
**AUTO SUPPLIES**  
Our big new Issue is  
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Make Money Equipping old FORDS and CHEVROLETS  
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Car owners prefer

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because they make repairs and  
adjustments easy, prevent broken  
parts and save time and temper.  
They are turned from solid bar  
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strength and reliability they are  
unexcelled.

With a No. 2 Set in his car the  
driver is ready for any emergency.  
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Price \$1.75

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**Oilproof—Rainproof**

**Black or Tan Leatherette  
with Non-breakable Peak**

A classy Cap for any season that  
will stand the roughest wear  
and still look new.

Sent Parcel Post  
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Genuine Fur-lined inside band  
to keep ears warm, 50c extra.

State Size and Color Desired  
Money back if not satisfied.



**Will Wear and Wear  
and Never Tear**

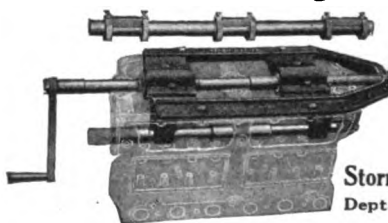
Dept. 14, **CRITERION CAP CO.**, 157 West 21st, N. Y. City

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**MOTOR REPAIR EQUIPMENT**

installed in your garage will double your profits and  
give you a reputation for *quick, accurate* repairing.

**The Storm Main Bearing Babbitting and Boring Tool**



for Ford and Fordson Mo-  
tors—puts in new, perfect  
bearings exactly the same as  
the original and in the prop-  
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Write today for complete information

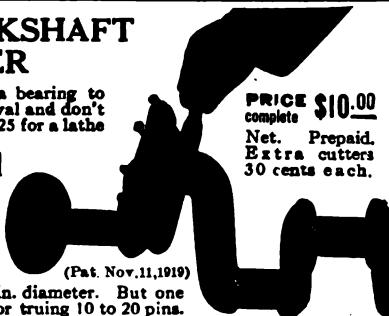
**Storm Manufacturing Company**  
Dept. E Minneapolis, Minn.

## ATLAS CRANKSHAFT GRINDER

Don't attempt to scrape a bearing to  
crank pin that has worn oval and don't  
pay a machine shop \$15 or \$25 for a lathe  
job. Use an

**Atlas Grinding Tool**

It will true up a crank-  
shaft to less than one-  
thousandth of an inch in  
less than one hour without  
removing shaft from crank  
case. Adjustable to all  
crank pins from 1 1/4 to 2 1/2 in. diameter. But one  
tool needed, cutters good for truing 10 to 20 pins.  
5,000 in use. Send for circular describing



**PRICE \$10.00**  
complete  
Net. Prepaid.  
Extra cutters  
30 cents each.

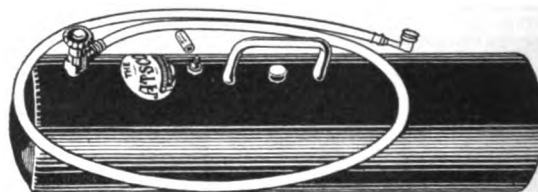
**ATLAS GARAGE UNIT**

A machine for testing and straightening crankshafts, and gear press with housing  
assembly and piston vice attachments.

**ATLAS MANUFACTURING COMPANY**

Millvale Sta. "Dept. B"

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The great time and back saver for filling tires. Once  
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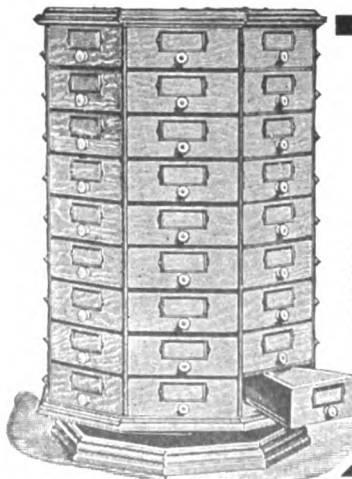
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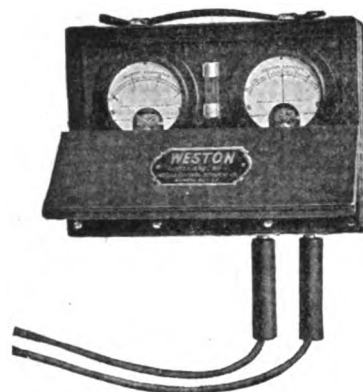
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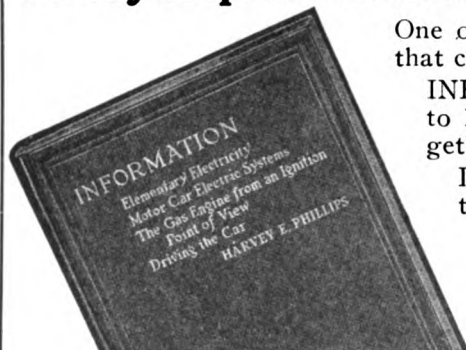
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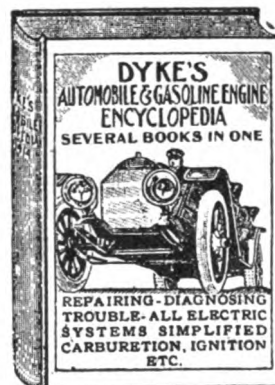
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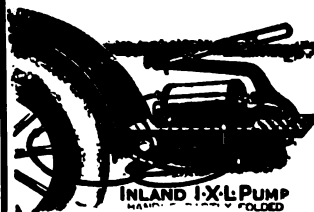
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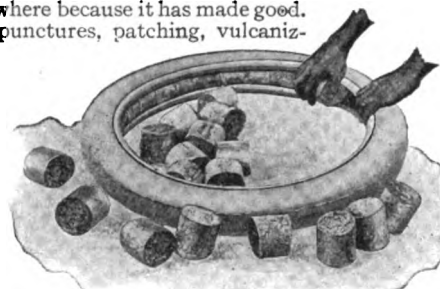
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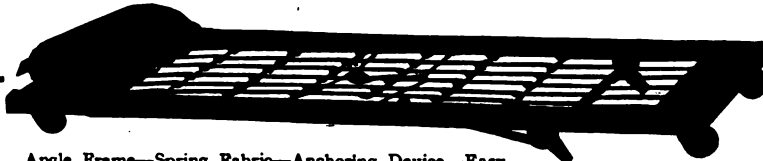
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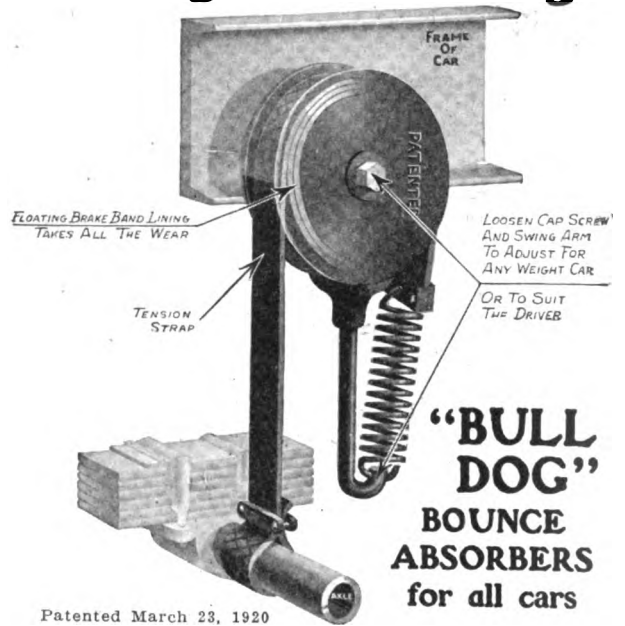
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## KEEPING LOCK NUTS IN PLACE

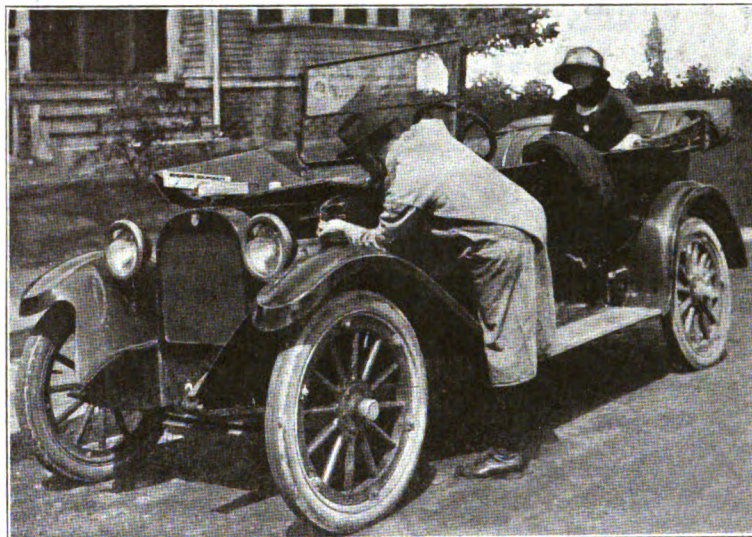


and securing them against unscrewing during vibration is effectively accomplished by applying a trace of NOKORODE at the junction (A) and slightly soldering same. Use just a small quantity of solder. If (B) happens to be cut off flush with top of nut, solder over very lightly. This job is equally effective on brass, copper, iron, steel and zinc if NOKORODE is used.

## TAKING KNOCK OUT OF FORD CAR



When a Ford becomes noisy and needs new bearings on connecting rods or pistons, the old bearings may be scraped bright and freed from oil and babbit run in with a hot iron. Hold the bearings in the flame of blow torch; use NOKORODE as a flux; babbit metal as a solder and an iron to smooth it down. With a little care the babbit may be made approximately the correct shape and the bearings scraped and fitted as usual.

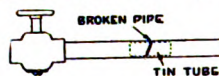


## TO SOLDER TERMINAL ON IGNITION WIRES



Cut insulation off about 1/4 inch on end of cable (Fig. 2) and clean. Run wire through small hole in terminal (Fig. 1), bend edges (A, B, C, D) over cable, then turn terminal over, bend end of wire down, apply NOKORODE and solder. This makes a strong job and also a first class electrical joint.

## REPAIRING BROKEN GASOLINE PIPES



Make a small tube from a piece of tin bent to fit the inside of the pipe and solder it in the inside of the broken pipe. If the tube is made a snug fit and NOKORODE is used and the joint soldered properly you will have as strong a pipe as a new one. Do not have iron too hot as it is liable to sweat too much solder into the main pipe.

## SOLDERING METAL FLOAT IN CARBURETOR



When metal float leaks it may be repaired as follows: Punch hole (2) and pour gasoline out, locate leak, clean both holes, apply NOKORODE and solder with well tinned and heated iron, using only enough solder to stop leak.

## REPAIRING LEAK IN GASOLINE TANK



Without removing from car. Make a patch of sheet copper, and pen with the round end of the hammer so that it is dished quite a little as shown in "B." Apply NOKORODE and thoroughly tin the inside of this patch. After applying NOKORODE to tank around the leak, heat your soldering copper very hot, place the patch on it and put it in position. After pressing hard enough to work out all surplus solder and smoothing up edges you have a satisfactory and dependable job. When soldering on your gas tank always be sure tank is absolutely dry and free from gas.

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## Motorists find the NOKORODE SOLDERKIT invaluable on account of its many uses

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